Prepared for:

Waste Management of Virginia, Inc.
King George Recycling and Waste Disposal Facility
10376 Bullock Drive
King George, Virginia 22485

LANDFILL BIOREACTOR PROJECT JANUARY 2004 SEMI-ANNUAL REPORT OF MONITORING ACTIVITIES

KING GEORGE RECYCLING AND WASTE DISPOSAL FACILITY

King George County, Virginia VADEQ Solid Waste Permit No. 586

Prepared by:

GEOSYNTEC CONSULTANTS
10015 Old Columbia Road, Suite A-200
Columbia, Maryland 21046

Project No.: ME0284

19 January 2004

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

TABLES

FIGURES

DRAWINGS

TABLE OF CONTENTS
(continued)

APPENDICES

1. INTRODUCTION

1.1 Terms of Reference

The purpose of this semi-annual monitoring report is to present the results obtained between January 1, 2003 and June 30, 2003 of the Landfill Bioreactor Project at the King George Recycling and Waste Disposal Facility (King George Landfill) in King George County, Virginia. The bioreactor study is being performed by Waste Management of Virginia, Inc. (a Waste Management, Inc. (WMI) company) under the United States Environmental Protection Agency's (USEPA's) Project XL program. This monitoring report was prepared for the Virginia Department of Environmental Quality (VADEQ) by Mr. Douglas T. Mandeville and was reviewed by Mr. Thomas Ramsey, P.E., and Mr. Michael F. Houlihan, P.E., all of GeoSyntec Consultants (GeoSyntec), in accordance with the internal peer review policy of the firm. This report describes the monitoring activities between the above mentioned dates. To aid in the interpretation of the data, the tables and figures contain all of the data collected since leachate recirculation began on November 1, 2002.

1.2 Project Overview

The King George Landfill is located in King George County, Virginia, approximately 50 miles north-northeast of Richmond, Virginia. The waste disposal area will cover a total area of approximately 290 acres upon completion. Construction of the first cells started in 1996 and construction of additional liner area has been performed every year since. The King George Landfill was constructed having a geomembrane composite double-liner system, with primary leachate collection and leak detection (secondary collection) layers. The current configuration of Cells 1 through 4, including the recirculation trenches, is shown in Figure 1 and in Drawing 1. As part of the XL program, Cell 3 is operated as a bioreactor (i.e., leachate is recirculated), whereas Cells 1, 2, and 4 are operated as standard landfill cells (i.e., no leachate is recirculated). Cell 3 of the King George Landfill is referred to as the test area. Cells 1, 2, and 4 are referred to as the control area.

A landfill becomes a bioreactor when leachate and other liquids are added to the landfill. The purposes of operating a landfill as a bioreactor are to increase the rate of biodegradation in the landfill and to facilitate the management of leachate and other waste liquids. The original intent of the XL program was to recirculate all of the

leachate generated at the site, plus an additional amount of non-hazardous liquids. The goal is to recirculate between 7 million and 8 million gallons of leachate and other non-hazardous liquids per year. This is approximately twice the typical leachate generation rate at King George. WMI will seek to recirculate this amount, while maintaining compliance with applicable rules and regulations. At the time when the program was initially implemented in November 2002, an increase in the occurrence of leachate seeps was observed, causing site personnel to reduce or curtail recirculation operations. As a result of the observed increase in leachate seeps, in the interest of maintaining good landfill operating practices and complying with environmental protection regulations, the actual amount of leachate recirculated may be less than 8 million gallons per year. The amount of liquid applied to the waste will vary based on site inspections and observations. Regardless of the quantity of leachate recirculated, the requirement to perform monitoring during the course of the program will continue.

It is anticipated that the operation of Cell 3 as a bioreactor will result in several environmental and cost saving benefits including, but not limited to, the following: (i) decreased leachate management costs; (ii) increased waste density in the landfill; (iii) reduced period of landfill gas generation; and (iv) improved long-term leachate quality. These benefits are discussed in depth in WMI's Project XL application [GeoSyntec, 2000].

The performance of the landfill is evaluated based on measurements of critical chemical and physical parameters associated with the solids, liquids, and gasses obtained from the test and control areas. Parameters to be measured include: settlement, leachate quantity, leachate quality, in-place density of waste, and air quality. The parameters measured in the bioreactor (i.e., test area) are compared to similar parameters measured from the control area.

1.3 Report Organization

In this report, the results of the analytical tests conducted during calendar year 2002 are provided. The organization of this report is described below.

- Section 2 addresses the Federal Register site specific rule making.
- Section 3 presents the requirements of the VADEQ Experimental Permit.
- Section 4 describes the sampling and sampling and analysis activities performed during the first half of calendar year 2003.

- Section 5 describes the analytical test results and other data collected during the first half of calendar year 2003.
- Section 6 presents closing comments.
- Section 7 provides references.
- Appendix A presents the leachate laboratory analysis results.
- Appendix B presents the liquid application logs (a daily and monthly liquid application summary is presented in Table 7).
- Appendix C presents settlement data.
- Appendix D presents landfill gas data.
- Appendix E presents groundwater quality compliance data.

2. REQUIREMENTS OF FEDERAL REGISTER SITE SPECIFIC RULE MAKING

On July 18, 2002, the EPA promulgated a site-specific rule to implement this project under the USEPA's Project Excellence and Leadership Program (Project XL). This rule was published in the Federal Register and provides site-specific regulatory flexibility under the Resource Conservation and Recovery Act (RCRA) for the King George Landfill. Part 258, Subpart D of the rule identifies 14 conditions that are to be met while leachate is recirculated at the King George Landfill. The remainder of this section addresses 12 of these conditions; the last two conditions are related to the duration of and compliance with the site specific rule.

1) *Item 1 relates to the integrity of the liner system and maintaining less than 30 cm of head on the liner system.* In accordance with Item 1, the integrity of the liner system was maintained during construction of the recirculation trenches and the leachate collection system has been maintained in good operating order. To date, the leachate collection records in the test and control areas do not indicate an increase in the leakage rate through the primary liner system. It is noted that design calculations showed that up to 7 to 8 million gallons of liquid per year could be added to the waste mass and that the head on the liner system would remain less than 30 cm. The liquid application rate is approximately 2.4 million gallons per year based on data collected between November 1, 2002 and December 31, 2003. Based on the design calculations and the actual leachate recirculation rate, the head on the liner system is expected to be less than 30 cm. Additionally, the leachate collection system has been designed to operate such that the leachate removal pumps turn on when the head acting on the liner system is at or below 30 cm.

   With regard to maintaining the integrity of the liner system, there are no apparent signs of slope movement based on daily observations at the site.

2) *Item 2 relates to the Code of Federal Regulations (CFR) Section 258.40.* In accordance with Item 2, the groundwater quality has been monitored and analyzed at the compliance point. This analysis was performed by Joyce Engineering, Inc. (Joyce Engineering); a copy of the letter is presented in Appendix E. Arsenic, Cadmium, and Lead have been detected at concentrations that exceed the current MCL; however, it is noted that the

detected concentrations were less than the facility background concentrations at the time of detection. Joyce Engineering determined that the concentrations were not statistically significant. As per VADEQ, the monitoring program at the King George Landfill, Permit No. 586, was allowed to continue in the Detection Monitoring Program.

3) *Item 3 relates to the occurrence of seeps at the landfill.* Surface seeps have occurred at the King George Landfill after leachate recirculation operations started. These minor seeps were short in duration and were repaired quickly. These seeps are most likely attributed to the leachate recirculation operations at the site. In accordance with Item 3, WMI is in the process of identifying operating procedures that minimize the occurrence of seeps. Because WMI will operate the King George Landfill in an environmentally responsible manner, the amount of leachate that is recirculated may need to be reduced. Hence, the actual amount of leachate recirculated has been less than the target amount of 8 million gallons per year.

4) *Item 4 relates to the leachate quality parameters to be analyzed as part of this project.* In accordance with Item 4, the evaluation of the key leachate quality parameters occurred at the frequency presented in the Final Project Agreement [GeoSyntec, 2000] and the VADEQ state permit [GeoSyntec, 2001]. The test results are discussed in Section 5.1. It should be noted that these parameters (or groups of parameters) have been analyzed in leachate samples collected from the test and control areas. Appendix A includes a summary of the leachate parameters that exceeded the MCL or the detection limits. A complete set of laboratory results is available upon request.

5) *Item 5 relates to the quantity of leachate applied to the test area and the amount of leachate collected in the test and control areas of the landfill.* These issues are discussed in Section 5.1.

6) *Item 6 relates to an initial characterization of the liquid that was added to the test area.* An initial characterization of the leachate added to the landfill was performed in September 2002. The results of this analysis indicate that the leachate is comparable to typical landfill leachate. The results of this characterization are discussed in Section 5.1.

7) *Item 7 relates to the occurrence of landfill fires in the test area and the measurement of gas temperature at the wellheads.* The test area at King George has been operated in a manner to prevent landfill fires from occurring and none have been observed during the project. The gas temperature at the wellheads is discussed in Section 5.2.

8) *Item 8 relates to topographic surveys at the site.* In accordance with Item 8, one topographic survey was performed in 2002. The survey was conducted in November 2002. Because only one survey was conducted at the King George, settlements cannot be calculated at this time.

9) *Item 9 relates to odor complaints resulting from liquid application events.* Several odor complaints were reported at King George during the reporting period. At this time, it is not clear if these odor complaints can be directly attributed to the bioreactor operations.

10) *Item 10 relates to an initial waste characterization in the test area of the landfill.* A total of five borings were drilled in the summer of 2001. Two of these borings were in the control area and three were in the test area. The results of the laboratory testing of these solid waste samples are discussed in Section 5.3. During November 2003, three borings were drilled in the test area and two were drilled in the control area. The laboratory test of these samples is in progress and will be discussed in the next semi-annual monitoring report. Field observations from this sampling event are discussed in Section 5.3.

11) *Item 11 relates to the preparation of semi-annual reports to the EPA Regional Administrator.* Previous semi-annual monitoring reports were submitted on 8 May 2003 and 17 July 2003. The next semi-annual monitoring report will be submitted in July 2004.

12) *Item 12 relates additional monitoring related to the landfill gas.* The monitoring requirements for the New Source Performance Standards and the Title V Air Permit for the site were met. Copies of the wellhead monitoring results and the surface scans are presented in Appendix D.

3. REQUIREMENTS OF VADEQ EXPERIMENTAL PERMIT

On July 18, 2002, the state issued a permit modification allowing bioreactor operations in Phases 1 and 2 at the King George Landfill. Permit module I.F. of the permit amendment issued July 18, 2002, identifies several site specific conditions that must be met while leachate is recirculated at King George. The remainder of this section addresses each of these conditions.

1) *Item I.F.1 relates to the issuance of a Certificate to Operate.* Construction of the liquid application trenches was completed within 180 days of the issuance of the permit amendment. A renewal letter to continue recirculation operations will be submitted in July 2003.

2) *Item I.F.2 relates to the expiration of the experimental permit and request for a full permit amendment.* This report presents the data obtained during the first half of calendar year 2003. At this time, there is not enough data available to draw conclusions from the experiment. If the project is found to be a success, WMI anticipates submitting a request for a full permit amendment.

3) *Item I.F.3 relates to the permitted landfill bioreactor area, Phases 1 and 2.* In accordance with the permit requirements, the liquid application trenches were constructed in Cell 3, and liquid was applied only in this part of the landfill.

4) *Item I.F.4 relates to the monitoring, sampling, and reporting requirements.* In accordance with Item I.F.4, the monitoring was completed as identified in Permit Attachment IIB-2. Previous quarterly monitoring reports were submitted in May 2003 and June 2003. It is anticipated that the next quarterly monitoring report will be submitted in September 2003.

5) *Item I.F.5 relates to the Title V Air Permit Issued January 10, 2002 and the New Source Performance Standards Subpart WWW.* In accordance with Item I.F.5, WMI complied with the regulations identified in the Title V Air Permit and the New Source Performance Standards Subpart WWW.

6) *Item I.F.6 relates to managing leachate as a hazardous waste if the characterization of leachate indicates that it is hazardous in accordance*

with the Virginia Hazardous Waste Management Regulations (9 VAC 20-60-10). (It should be noted that leachate is not explicitly listed as a hazardous waste in the Virginia Hazardous Waste Management Regulations). The initial leachate characterization indicates that the leachate at King George is not a Hazardous Waste.

7) *Item I.F.7 relates to the monitoring of leachate head over the liner at its lowest disposal point to ensure that no more than 1 foot of head of leachate accumulated over the liner.* The issue of hydraulic head acting on the liner system is addressed in Section 2, Item 1.

8) *Item I.F.8 relates to the closure of the bioreactor landfill area.* At this time, WMI plans to continue bioreactor operations in Cell 3 at King George. In accordance with Item I.F.8, WMI will notify VADEQ at least 180 days prior to the anticipated date of closing.

4. MONITORING PROGRAM AND SAMPLING AND ANALYSIS ACTIVITIES

4.1 Monitoring Program

As shown in Table 1, the monitoring activities at the King George Landfill consist of tracking the quality and quantity of leachate, landfill gas, and solid waste in the test and control areas. Detailed monitoring activities for the Landfill Bioreactor Program are described in the document entitled, *"Monitoring, Sampling, and Analysis Plan"* (Monitoring Plan) [GeoSyntec, 2001], which is contained in the permit application submitted to VADEQ. As part of the USEPA XL program and VADEQ permit requirements, a series of site-specific rules and monitoring requirements have been developed. The USEPA site-specific rule appeared in the Federal Register on July 18, 2002; these requirements are addressed in Section 2 of this report. The VADEQ site-specific permit requirements appeared in the state permit modification issued for the site on July 18, 2002; these requirements are addressed in Section 3 of this report. Table 1 shows the schedule for the 2003 monitoring events; Table 2 summarizes the dates and sampling events that occurred to date. The leachate monitoring events include collecting leachate samples from the control area and the test area for subsequent laboratory analysis. The landfill gas monitoring events includes measuring landfill gas composition at the wellheads in the control and test areas, obtaining landfill gas composition samples, and performing a surface scan to measure surface emissions. The solid waste monitoring event includes obtaining waste samples for subsequent analysis. In addition to these field monitoring events, leachate generation volumes, liquid application volumes, and landfill settlement are monitored.

The purpose of the monitoring program is to evaluate the performance of the landfill bioreactor throughout the duration of the project. The evaluation is based on the following performance criteria:

- leachate quality and quantity;
- landfill gas quality and quantity; and
- solid waste decomposition/stabilization.

The manner in which these criteria are evaluated is described in the following three subsections.

Leachate Quality and Quantity

Sampling activities are conducted in both the test area and control area. Leachate sampling was conducted in Cells 1, 2, 3, and 4, and at the leachate storage tank, according to the frequency described in Table 1. Leachate samples are collected by filling the appropriate sample bottles directly from the sampling ports from the primary leachate collection system for the respective phase being sampled. The sampling ports for each of the primary leachate collection systems are located within the vault/riser house of the leachate collection system for each phase. The specific parameters measured, and the associated test methods, are provided in Table 3. Several key parameters that identify the presence of biological processes in the landfill have been identified (Pohland and Harper, 1986) and are presented in detail in this report. These parameters include: (i) Biological Oxygen Demand (BOD); (ii) Chemical Oxygen Demand (COD); (iii) Total Organic Carbon (TOC); (iv) Chloride; (v) Sulfate; (vi) Nitrate as Nitrogen; and (vii) Ammonia as Nitrogen. From these indicators, a qualitative inference can be made regarding the degree of organic composition of landfill wastes.

In addition to evaluating the leachate quality in the landfill over time, the amount of liquid added to the leachate recirculation trenches and the amount of leachate collected in the leachate collection sumps was recorded.

Landfill Gas Quality and Quantity

Measurements of landfill gas quality are obtained from composite gas samples of the landfill gas collection system. The parameters measured and the test methods for the landfill gas monitoring and sampling are described in the Monitoring Plan [GeoSyntec, 2001]. The non methane organic compounds (NMOCs), gas samples were obtained in accordance with the requirements of USEPA Method 25 and samples obtained for volatile organic compounds were obtained in accordance with USEPA Method TO-14.

Landfill gas monitoring is performed at each of the existing landfill gas wells to monitor activity within the test and control areas. Measurements of methane (CH_4), oxygen (O_2), carbon dioxide (CO_2), temperature, and flow rate were obtained from each gas well using portable field instruments, (i.e., a Landtech, Inc., GEM 500). Hydrogen sulfide (H_2S) measurements were obtained using a GasTech GT-2 Hydrogen sulfide detector.

Surface emissions monitoring is performed in accordance with the requirements specified by the New Source Performance Standards (NSPS) and Emissions Guidelines (EG) for MSW landfills [40 CFR 60.755]. Methane concentrations were measured within 5 to 10 centimeters (2 to 4 inches) from the landfill surface in the test and control areas.

Solid Waste Decomposition/Stabilization

To evaluate the degree of decomposition of the solid waste, a series of borings were drilled in the test and control areas in 2001. Samples of the solid waste were obtained from these borings. The parameters evaluated from these solid waste samples include: (i) moisture content; (ii) cellulose; (iii) lignin; (iv) pH; and (v) biochemical methane potential. The moisture content is the percentage of water that is present in the waste. Cellulose is the portion of the volatile solids that will degrade over time; lignin is the portion of the volatile solids that will not degrade. Biochemical methane potential is a measure of how much methane the waste may generate.

To evaluate waste settlement in both the test area and the control area, a series of topographic surveys of the test and control areas are conducted.

4.2 Sampling and Analytical Activities

The overall monitoring and sampling program was implemented by GeoSyntec personnel with sampling performed by Joyce Engineering and WMI site personnel.

4.2.1 Leachate Quality

Leachate samples from the test and control areas were obtained by Joyce Engineering on the dates presented in Table 2. The leachate samples were collected from sumps in Cells 1, 2, 3, 4, as well as the leachate storage tank. The leachate samples were collected using the field sampling procedures described in the Monitoring Plan contained in the permit application for leachate recirculation at the site [GeoSyntec, 2001].

Leachate samples were analyzed by Severn Trent Laboratories, Inc. and were tested for the parameters listed in Table 3. A summary of the key parameters identified in Section 4.1 are presented in Table 5. Also included in Table 5 are the parameters listed in the Federal Register site-specific rule (i.e., wet chemistry parameters, heavy metals, and common ions). The test results for the organic priority pollutants are not anticipated to indicate the overall performance of the test area and are not presented in Table 5 at this time. Section 5.1 of this report provides an analysis of the leachate quality data.

4.2.2 Landfill Gas Quality

The landfill gas samples were collected using the procedures described in the Monitoring Plan contained in the permit application for leachate recirculation at the site [GeoSyntec, 2001]. The landfill gas composition in the wellheads in the test and control areas were tested for the percentages of oxygen, carbon dioxide, methane, flow rate, and temperature. The landfill gas composition at the wellheads is summarized in Table 4.

The landfill gas samples from the header pipes in the landfill gas collection system were sent to Triangle Environmental Services for laboratory analysis. These landfill gas samples were tested in accordance with USEPA method TO-14. Copies of these results are presented in Appendix D.

4.2.3 Solid Waste Sampling

Prior to construction of the leachate recirculation system, a series of exploratory borings were drilled in both the test and control areas. Samples of solid waste were collected from a variety of depths at each boring location. Solid waste samples were obtained from five locations during November 2003. The solid waste samples collected during the field activities were sent to Virginia Tech and were analyzed for moisture content, lignin, cellulose, pH, and biochemical methane potential. The results from the initial background samples are discussed in Section 5.3. The laboratory tests on the November 2003 samples are in progress and the results are not available at this time. Results from this testing will be available in the next semi-annual monitoring report. Field observations made during the November 2003 sampling event are discussed in Section 5.3.

4.3 Other Data

4.3.1 Leachate Generation Quantities

Leachate flow was measured bi-weekly in Cells 1, 2, 3, and 4 by site personnel using flowmeters that are installed in the leachate riser vaults near each cell. The leachate generation quantities for each cell are presented in Table 6.

4.3.2 Quantity of Liquid Applied to Landfill

The amount of liquid added to each trench was recorded by site personnel. The current trench configuration is shown in Figure 1. In general, liquid was added to each trench approximately every three days. A summary of the liquid added to the test area is presented in Table 7.

4.3.3 Landfill Settlement

A series of topographic surveys of the test and control areas has been performed by Flora Surveying. An approximately 100-ft grid system was established, with the elevation measured at the same locations over time. A summary table containing the point identification number, northing, easting, and elevations at the initial survey date is presented in Table 8. The survey grid is shown on Drawing 2.

5. DATA ANALYSIS

5.1 Leachate Quality and Quantity

Liquid application at the King George Landfill began on November 1, 2002. During the reporting period, leachate was added to the test area. Figure 2 shows the liquid added to the test area, and the target rate of 7 million to 8 million gallons per year (583,333 to 666,666 gallons per month). Between January 1, 2003 and June 30, 2003 the total amount of leachate applied to the landfill was 1,631,185 gallons. Between July 1, 2003 and December 31, 2003, the total amount of leachate added to the landfill was 93,937 gallons. Therefore, approximately 1,725,122 gallons of leachate have been recirculated during the 2003 calendar year. To date, a total of 2,857,175 gallons of leachate have been recirculated at King George Landfill.

In reviewing Table 7, it can be seen that very little leachate has been recirculated at King George Landfill over the last six months. Observations of the recirculation operations have indicated that the infiltration rate of the trenches has decreased significantly.

It should be noted that observed leachate seeps that occurred during the reporting period resulted in landfill operations taking a more cautious approach to recirculating leachate in the second half of 2003. This issue has been addressed through a review of leachate recirculation practices and coordination of observations between when leachate is recirculated and the occurrence of leachate seeps. As a result of this review, it is expected that leachate recirculation application rates will increase in 2004 as compared to those recorded during the last half of 2003.

Through 31 December 2003, the site was approximately 9.2 inches ahead of its normal annual precipitation. Table 9 shows the average monthly precipitation, 2003 monthly precipitation, and the departure from normal.

The amount of leachate collected in the test and control areas during the operation of the liquid application system between July 1, 2003 and December 31, 2003 was 308,200 and 1,567,350 gallons, respectively. Since November 2002, the total amount of leachate collected in the test and control areas was 938,600 and 2,488,7550 gallons, respectively. Figure 2 also shows the leachate collection quantities for the test and control areas.

In examining Figure 2, there does not appear to be a correlation between the liquid applied to the landfill and the leachate collected in the leachate collection system.

Figures 3 through 8 show variation with time in the BOD to COD ratio, COD to TOC ratio chloride, nitrate nitrogen, ammonia nitrogen, and pH, respectively. These figures represent the key leachate parameters identified in Table 5. It should be noted that the analyses of the background leachate quality samples (dated September 27, 2002) are within typical ranges for landfill leachate. Additionally, the leachate samples continue to indicate values of biological oxygen demand (BOD) value the lower range of typical landfill leachate. Table 5 shows a range between approximately 50 mg/l and 3,300 mg/l; typical values range from 20 mg/l to 35,000 mg/l [Kjeldsen et al., 2002].

Additional data related to the leachate quality test results is presented in Appendix A. The tables in Appendix A summarize the leachate parameters that exceed the MCL or were at detectable levels.

5.2 Landfill Gas Quality and Quantity

Table 4 summarizes the landfill gas composition and temperature measured at the wellheads. The wellheads are identified as being located in the test or control areas. The temperatures measured at the wellheads are within normal ranges; this indicates that there are no landfill fires within the test or control areas.

The trends in the landfill gas quantity for the gas wells in the test and control areas are shown in Figure 9. None of the gas wells presented in Figure 9 show consistent behavior at this time.

Figure 10 shows the percentage methane in the landfill gas at the wells in the test and control areas. The percentage of methane present in the landfill gas appears to have remained relatively constant over the first year of operation at the site, with the exception of GW-6. At this time, there does not appear to be a clear difference between the percentage methane present in the landfill gas in the test or control areas.

Figure 11 shows the percentage carbon dioxide in the landfill gas at the wells in the test and control areas. With the exception of Well GW-6, the percentage carbon dioxide present in the landfill gas wells has remained relatively constant. At this time,

there does not appear to be a clear difference between the percentage carbon dioxide present in the landfill gas in the test and control areas.

5.3 Solid Waste Analysis

Table 10 summarizes the baseline solid waste sampling results from the field work conducted in the summer of 2001. These results appear to be fairly typical for MSW. Future comparisons will be made as subsequent solid waste samples are obtained from the test and control areas.

During November 2003, a solid waste sampling event was conducted at King George. The laboratory test results of this event are not available at this time; the remainder of this section discusses field observations during the sampling event. A copy of the field report, boring logs, and a figure showing the boring locations has been included in Appendix F of this report, a summary of this information is provided here.

The borings from the control area were drilled to a depth of approximately 60 ft. At these two locations, the waste samples appeared to be typical MSW. There was no apparent change in the water content with depth based on a visual classification. The degree of sample degradation (indicated by the inability to identify items in the sample) did appear to increase with depth.

Three borings were drilled in the test area at varying horizontal offsets from the recirculation trenches. Boring T-1 was drilled approximately 50-ft from a recirculation trench, boring T-2 was drilled approximately 25-ft from a recirculation trench, and boring T-3 was approximately 15-ft from a recirculation trench. In general, a change in the water content of the waste was observed; at each location a layer of very wet waste was encountered. The layer of wet waste was encountered closer to the ground surface as the borings moved closer to the recirculation trenches (i.e., there does appear to be some lateral and vertical movement of leachate through the waste mass). At boring T-2, the wet waste was encountered at about 37-ft below the ground surface, as the boring advanced past 40-ft below ground surface, the waste appeared to become drier. At boring T-3, there appeared to be a layer of soil underlying the layer of wet waste.

Additionally, a series of borings were drilled at the midpoint of three of the recirculation trenches. The goal of these borings was to drill in to the trenches and verify the trench conditions. At each location, a layer of wet waste was encountered

before the trenches were reached. The borings could not be advanced beyond this layer, therefore, it was not possible to verify the conditions of these three recirculation trenches.

6. CONCLUSIONS

This report has provided a summary of the monitoring activities at the King George Landfill as part of the leachate recirculation operations conducted under the USEPA's XL Program. Because the program is only in its initial stages, conclusions regarding the performance of the test area at the King George Landfill cannot be provided at this time. However, based on the experience gained during the design, permitting, construction processes, and initial start up of the program, the following comments are offered.

- Operational conditions (i.e., weather, site access, etc.) may make leachate recirculation without a pump system difficult. For example, during periods of wet weather, leachate haul trucks may not be able to access leachate recirculation trenches. It is anticipated that a leachate pumping system will be installed in 2004 to eliminate the need to haul leachate to the recirculation trenches.

- Using the operational techniques identified in the Project XL program for King George Landfill, the anticipated benefits (i.e., settlement, improved leachate quality, and improved landfill gas quality) require more than one year to be realized.

- Based on the information obtained to date, it has been observed that leachate recirculation has been performed without major impacts (i.e., excessive odors, slope stability problems, etc.). However, additional effort has been required to review the relationship of observed leachate seeps with leachate recirculation activities. It is expected that the next semi-annual report will include a further discussion of this issue as operations recommence with increased leachate recirculation in 2004.

- The effective infiltration rate for leachate in the trench systems designed for the site appears to be decreasing after approximately do not appear to be working as well as during their initial six months of use. Additionally, the field observations during the solid waste sampling event indicates the presence of wet and dry layers of waste in the recirculation area (i.e., vertical movement may be inhibited by the presence of soil layers within the waste mass).

- Because the trenches appear to have a reduced infiltration capacity when compared to their initial design, the ability to accept liquids is reduced.

Consequently, a 10-acre area may not be large enough to recirculate the target amount of leachate.

- In 2004, WMI will consider different alternatives to improve liquid distribution in the recirculation area. WMI is considering a systematic pattern of vertical conduits to increase liquid distribution through the recirculation area. It is anticipated that the vertical conduits may be similar in nature to a landfill gas extraction well.

A summary monitoring events planned for 2004 is presented in Table 11.

7. REFERENCES

GeoSyntec Consultants, 2000, "*Project XL – Final Project Agreement for Landfill Bioreactor Systems – King George County Landfill and Recycling Center and King George Recycling and Waste Disposal Facility*", dated 28 September 2000.

GeoSyntec Consultants, 2001, "*Landfill Bioreactor Project Application for Permit Amendment for Experimental Permit*," King George Recycling and Waste Disposal Facility, dated 19 September 2001.

Kjeldsen, P., Barlaz, M.P., Rooker, A.P., Baun, A., Ledin, A., and Christensen, T.H., 2002, "*Present and Long-Term Composition of MSW Landfill Leachate: A Review*", Critical Reviews in Environmental Science and Technology, 32 (4), p. 297-336.

Pohland, F.G., and Harper, S.R., 1986, "*Critical Review and Summary of Leachate and Gas Production From Landfills*", EPA/600/2-86/073, U.S. Environmental Protection Agency, Cincinnati, Ohio.

Title 40, Code of Federal Regulations, Part 60.

TABLE 1

2003 MONITORING ACTIVITIES

Project XL

King George County Landfill and Recycling Center

King George County, Virginia

	Monitoring Parameters	Responsible Party	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1. LEACHATE	Chemical parameters measured on site	WM personnel	X	X	X	X			X			X		
	Physical parameters measured on site	WM personnel	X	X	X	X	X	X	X	X	X	X	X	X
	Chemical parameters sampled on site from test area	Sampled by subcontractor, tested offsite by Geochemical	X	X	X	X			X			X		
	Chemical parameters sampled on site from storage tanks	Sampled by subcontractor, tested offsite by Geochemical	X	X	X	X			X			X		
2. LANDFILL GAS	Landfill gas composition measured on site	WM personnel	X	X	X	X	X	X	X	X	X	X	X	X
	Physical parameters measured on site	WM personnel	X	X	X	X	X	X	X	X	X	X	X	X
	Chemical parameters	WM personnel, testing by subcontractor	X	X	X	X			X			X		
	Surface landfill gas measured on site	Subcontractor	X	X	X	X			X			X		
3. SOLID WASTE	Survey, on site	Subcontractor		X		X		X		X		X		X
	Solid waste stabilization and decomposition measured on site	WM personnel										X		

TABLE 2
SUMMARY OF SAMPLING ACTIVITIES
Project XL
King George County Landfill and Recycling Center
King George, Virginia

Date	Sampling Event
9/27/2002	Background leachate sampling
9/30/2002	Background landfill gas sampling
10/9/2002	Background landfill gas sampling
10/28/2002	Background leachate sampling
11/11/2002	Topographical site survey
11/14/2002	Monthly landfill gas sampling
11/25/2003	Monthly leachate sampling
12/18/2002	Monthly landfill gas sampling
12/19/2002	Monthly leachate sampling
1/23/2003	Monthly landfill gas sampling
1/27/2003	Monthly landfill gas sampling (composite samples)
1/27/2003	Monthly leachate sampling
1/29/2003	Monthly landfill gas sampling (surface emission scan)
2/24/2003	Monthly leachate sampling
2/24/2003	Monthly landfill gas sampling (composite samples)
2/25/2003	Monthly landfill gas sampling
3/19/2003	Monthly landfill gas sampling (surface emission scan)
3/24/2003	Monthly leachate sampling
3/24/2003	Monthly landfill gas sampling (composite samples)
3/25/2003	Monthly landfill gas sampling
4/16/2003	Monthly leachate sampling
4/16/2003	Monthly landfill gas sampling
4/16/2003	Monthly landfill gas sampling (composite samples)
6/13/2003	Monthly landfill gas sampling
7/14/2003	Quarterly leachate sampling
7/15/2003	Monthly landfill gas sampling
8/13/2003	Monthly landfill gas sampling
9/15/2003	Monthly landfill gas sampling
10/14/2003	Quarterly leachate sampling
10/15/2003	Monthly landfill gas sampling
11/13/2003	Monthly landfill gas sampling

TABLE 3
LEACHATE ANALYSIS PARAMETERS
Project XL
King George County Landfill
King George County, Virginia

Parameter	Method	Parameter	Method
Cadmium	EPA 200.7	Bromochloromethane	EPA 8260B
Potassium	EPA 200.7	Bromomethane	EPA 8260B
Chloride	EPA 325.2	Carbon Disulfide	EPA 8260B
Ammonia Nitrogen	EPA 350.1	Carbon Tetrachloride	EPA 8260B
Total Kjeldahl Nitrogen	EPA 351.3	Chlorobenzene	EPA 8260B
Nitrate Nitrogen	EPA 353.2	Chlorodibromomethane	EPA 8260B
Phosphorus, ortho	EPA 365.2	Chloroethane	EPA 8260B
Phosphorus, total	EPA 365.2	Chloromethane	EPA 8260B
Sulfate	EPA 375.4	cis-1,2-Dichloroethene	EPA 8260B
Arsenic	EPA 6010 B	cis-1,3-Dichloropropene	EPA 8260B
Barium	EPA 6010 B	Dibromomethane	EPA 8260B
Chromium	EPA 6010 B	Dichlorobromomethane	EPA 8260B
Lead	EPA 6010 B	Dichlorodifluoromethane	EPA 8260B
Selenium	EPA 6010 B	Ethyl Methacrylate	EPA 8260B
Silver	EPA 6010 B	Ethylbenzene	EPA 8260B
Mercury	EPA 7470	Iodomethane	EPA 8260B
1,2-Dibromo-3-chloropropane	EPA 8011	Methacrylonitrile	EPA 8260B
1,2-Dibromoethane	EPA 8011	Methyl Ethyl Ketone	EPA 8260B
1,1,1,2-Tetrachloroethane	EPA 8260B	Methyl methacrylate	EPA 8260B
1,1,1-Trichloroethane	EPA 8260B	Methylene Chloride	EPA 8260B
1,1,2,2-Tetrachloroethane	EPA 8260B	Propionitrile	EPA 8260B
1,1,2-Trichloroethane	EPA 8260B	Styrene	EPA 8260B
1,1-Dichloroethane	EPA 8260B	Tetrachloroethene	EPA 8260B
1,1-Dichloroethene	EPA 8260B	Toluene	EPA 8260B
1,1-Dichloropropene	EPA 8260B	Total Xylene	EPA 8260B
1,2,3-Trichloropropane	EPA 8260B	trans-1,2-Dichloroethene	EPA 8260B
1,2-Dichlorobenzene	EPA 8260B	trans-1,3-Dichloropropene	EPA 8260B
1,2-Dichloroethane	EPA 8260B	trans-1,4-Dichloro-2-butene	EPA 8260B
1,2-Dichloropropane	EPA 8260B	Tribromomethane	EPA 8260B
1,3-Dichlorobenzene	EPA 8260B	Trichloroethene	EPA 8260B
1,3-Dichloropropane	EPA 8260B	Trichlorofluoromethane	EPA 8260B
1,4-Dichlorobenzene	EPA 8260B	Trichloromethane	EPA 8260B
2,2-Dichloropropane	EPA 8260B	Vinyl Acetate	EPA 8260B
2-chloro-1,3-butadiene	EPA 8260B	Vinyl Chloride	EPA 8260B
2-Hexanone	EPA 8260B	1,2,4,5-Tetrachlorobenzene	EPA 8270C
2-Methyl-1-propanol	EPA 8260B	1,2,4-Trichlorobenzene	EPA 8270C
3-Chloro-1-Propene	EPA 8260B	1,3-Dinitrobenzene	EPA 8270C
4-Methyl-2-Pentanone	EPA 8260B	1,4-Naphthoquinone	EPA 8270C
Acetone	EPA 8260B	1-Naphthylamine	EPA 8270C
Acetonitrile	EPA 8260B	1-Nitrosopiperidine	EPA 8270C
Acrolein	EPA 8260B	2,3,4,6-Tetrachlorophenol	EPA 8270C
Acrylonitrile	EPA 8260B	2,4,5-Trichlorophenol	EPA 8270C

TABLE 3
LEACHATE ANALYSIS PARAMETERS
continued

Parameter	Method	Parameter	Method
Benzene	EPA 8260B	2,4,6-Trichlorophenol	EPA 8270C
2,4-Dichlorophenol	EPA 8270C	Dibenzofuran	EPA 8270C
2,4-Dimethylphenol	EPA 8270C	Diethyl Phthalate	EPA 8270C
2,4-Dinitrophenol	EPA 8270C	Dimethoate	EPA 8270C
2,4-Dinitrotoluene	EPA 8270C	Dimethyl Phthalate	EPA 8270C
2,6-Dichlorophenol	EPA 8270C	Di-N-Butyl Phthalate	EPA 8270C
2,6-Dinitrotoluene	EPA 8270C	Di-N-Octylphthalate	EPA 8270C
2-Acetylaminofluorene	EPA 8270C	Di-n-propylnitrosamine	EPA 8270C
2-Chloro-Naphthalene	EPA 8270C	Diphenylamine	EPA 8270C
2-Chlorophenol	EPA 8270C	Disulfoton	EPA 8270C
2-Methyl-4,6-dinitrophenol	EPA 8270C	Ethyl Methanesulfonate	EPA 8270C
2-Methylnaphthalene	EPA 8270C	Famphur	EPA 8270C
2-Naphthylamine	EPA 8270C	Fluoranthene	EPA 8270C
2-Nitroaniline	EPA 8270C	Fluorene	EPA 8270C
2-Nitrophenol	EPA 8270C	Hexachlorobenzene	EPA 8270C
3,3-Dichlorobenzidine	EPA 8270C	Hexachlorobutadiene	EPA 8270C
3,3'-Dimethylbenzidine	EPA 8270C	Hexachlorocyclopentadiene	EPA 8270C
3-Methylcholanthrene	EPA 8270C	Hexachloroethane	EPA 8270C
3-Nitroaniline	EPA 8270C	Hexachloropropene	EPA 8270C
4-Aminobiphenyl	EPA 8270C	Indeno(1,2,3-cd)pyrene	EPA 8270C
4-Bromophenylphenylether	EPA 8270C	Isodrin	EPA 8270C
4-Chloro-3-methylphenol	EPA 8270C	Isophorone	EPA 8270C
4-Chloroaniline	EPA 8270C	Isosafrole	EPA 8270C
4-Chlorophenylphenylether	EPA 8270C	m,p-Cresol	EPA 8270C
4-Nitroaniline	EPA 8270C	Methapyrilene	EPA 8270C
4-Nitrophenol	EPA 8270C	Methyl Methanesulfonate	EPA 8270C
5-Nitro-o-toluidine	EPA 8270C	Methyl Parathion	EPA 8270C
7,12Dimethylbenz(a)-anthracene	EPA 8270C	Naphthalene	EPA 8270C
Acenaphthene	EPA 8270C	Nitrobenzene	EPA 8270C
Acenaphthylene	EPA 8270C	N-Nitrosodibutylamine	EPA 8270C
Acetophenone	EPA 8270C	N-Nitrosodiethylamine	EPA 8270C
Anthracene	EPA 8270C	n-Nitrosodimethylamine	EPA 8270C
Benzo(a)anthracene	EPA 8270C	n-Nitrosodiphenylamine	EPA 8270C
Benzo(a)pyrene	EPA 8270C	N-Nitrosomethylethylamine	EPA 8270C
Benzo(b)fluoranthene	EPA 8270C	N-Nitrosopyrrolidine	EPA 8270C
Benzo(ghi)perylene	EPA 8270C	o,o,o-Triethylphosphothioate	EPA 8270C
Benzo(k)fluoranthene	EPA 8270C	o-Cresol	EPA 8270C
Benzyl Alcohol	EPA 8270C	o-Toluidine	EPA 8270C
bis(2-Chloroethoxy)methane	EPA 8270C	Parathion	EPA 8270C
bis(2-Chloroethyl)ether	EPA 8270C	p-Dimethylaminoazobenzene	EPA 8270C
bis(2-Chloroisopropyl)ether	EPA 8270C	Pentachlorobenzene	EPA 8270C
bis(2-Ethylhexyl)phthalate	EPA 8270C	Pentachloronitrobenzene	EPA 8270C
Butyl benzylphthalate	EPA 8270C	Phenacetin	EPA 8270C
Chlorobenzilate	EPA 8270C	Phenanthrene	EPA 8270C
Chrysene	EPA 8270C	Phenol	EPA 8270C

TABLE 3
LEACHATE ANALYSIS PARAMETERS
continued

Parameter	Method	Parameter	Method
Diallate	EPA 8270C	Phorate	EPA 8270C
Dibenzo(a,h)anthracene	EPA 8270C	p-Phenylenediamine	EPA 8270C
Pronamide	EPA 8270C	Endrin Aldehyde	EPA 8081
Pyrene	EPA 8270C	Gamma BHC (Lindane)	EPA 8081
Safrole	EPA 8270C	Heptachlor	EPA 8081
sym-Trinitrobenzene	EPA 8270C	Heptachlor epoxide	EPA 8081
Thionazin	EPA 8270C	Methoxychlor	EPA 8081
Chemical Oxygen Demand	HACH 8000	Toxaphene	EPA 8081
Total dissolved solids	SM 2540C	2,4,5-T	EPA 8151A
Nitrite Nitrogen	SM 4500-NO2B	2,4-D	EPA 8151A
BOD 5-day	SM 5210B	Dinoseb	EPA 8151A
Total Organic Carbon	SM 5310C	Pentachlorophenol	EPA 8151A
Aldrin	EPA 8081	Silvex	EPA 8151A
Alpha BHC	EPA 8081	Pyruvic	
Beta BHC	EPA 8081	Lactic	
Chlordane	EPA 8081	Formic	
DDD	EPA 8081	Acetic	
DDE	EPA 8081	Proprionic	
DDT	EPA 8081	Butyric	
Delta BHC	EPA 8081		
Dieldrin	EPA 8081		
Endosulfan I	EPA 8081		
Endosulfan II	EPA 8081		
Endosulfan Sulfate	EPA 8081		
Endrin	EPA 8081		

Note

This list of parameters was developed from the Monitoring, Sampling, and Analysis Report included in the permit amendment submitted in October 2001.

TABLE 4
LANDFILL GAS DATA
Project XL
King George County Landfill and Recycling Center
King George, Virginia

FLARE

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	---	---	---	---	---	---	---	62	76	89	90	86	87	70	64
Flow Rate (scfm)	---	1980	1882	683	1524	2528	1326	1243	1404	636	1487	2089	2930	3593	2540
Methane (%)	---	48.6	46	47.3	34.9	47	44.2	39.6	39.5	55.7	44	51.9	55.3	50.6	50.8
Carbon Dioxide (%)	---	37.3	33.5	35.5	21.6	35	35.1	32.4	30.8	40.2	34.3	40.9	41.9	39	39
Oxygen (%)	---	2	4	3.4	9.9	2.9	3.4	5.6	6.1	1.7	4.3	1.6	0.6	1.1	2.4
Balance (%)	---	12.1	16.5	13.8	33.6	15.1	17.3	22.4	23.6	2.4	17.4	5.6	2.2	9.3	7.8

LFG WELL GW-1 (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	114	116	116	115	114	115	117	117	118	118	118	119	121	119	120
Flow Rate (scfm)	---	---	20	20	22	17	24	24	4	11	10	12	10	12	4
Methane (%)	51.4	45.8	40.9	52	51.9	48.5	52.3	57	52.7	55.7	55	49.7	50	48.6	54.6
Carbon Dioxide (%)	32.8	35.7	31.1	39.9	36.6	37.2	39.9	39.7	40.6	43	43	41.2	39.1	29.3	42.1
Oxygen (%)	3.8	2.3	4.5	0.2	1.5	0.5	0.5	0.9	1.5	0.6	0.7	0.7	0.6	1.2	0.4
Balance (%)	12	16.2	23.5	7.9	10	13.8	7.3	2.4	5.2	0.7	0.4	8.4	10.3	20.9	2.9

LFG WELL GW-1A (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	124	112	115	113	---	---	73	---	---	---	---	---	---	---	---
Flow Rate (scfm)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Methane (%)	44.9	56.2	59.8	51	---	---	57.8	---	---	---	---	---	---	---	---
Carbon Dioxide (%)	30.5	40.7	40.7	36.2	---	---	42.2	---	---	---	---	---	---	---	---
Oxygen (%)	5.1	0	0	2.2	---	---	0	---	---	---	---	---	---	---	---
Balance (%)	19.5	3.1	0	10.6	---	---	0	---	---	---	---	---	---	---	---

LFG WELL GW-2 (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	108	112	112	115	114	116	117	117	119	120	120	121	126	124	124
Flow Rate (scfm)	---	---	37	28	---	55	47	40	7	20	19	20	20	20	24
Methane (%)	54	45	46.8	53	55.6	52.1	52.8	53	55.8	58	56.3	51.2	55	50.2	51.9
Carbon Dioxide (%)	34.7	36.2	34.2	39.9	34.7	39	40.6	40.2	42.7	42	43.5	42.3	42	39.8	41
Oxygen (%)	2.2	1.2	3.3	0.9	2.4	0.3	0.5	0.3	0.4	0	0.1	0.3	0.8	0.9	0.8
Balance (%)	9.1	17.6	15.7	6.2	7.3	8.6	6.1	6.5	1.1	0	0.1	6.2	2.2	9.1	6.3

GW-1A was destroyed during construction activities in January 2003
Access to gas wells was limited due to waste placement activities.

TABLE 4
LANDFILL GAS DATA
(continued)

LFG WELL GW-2A (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	112	112	112	109	---	---	---	---	---	---	---	---	---	---	---
Flow Rate (scfm)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Methane (%)	63.9	44.2	58.1	58.3	---	---	---	---	---	---	---	---	---	---	---
Carbon Dioxide (%)	34.8	33.7	41.9	40.5	---	---	---	---	---	---	---	---	---	---	---
Oxygen (%)	1.1	3.7	0	0.4	---	---	---	---	---	---	---	---	---	---	---
Balance (%)	0.2	18.4	0	0.8	---	---	---	---	---	---	---	---	---	---	---

LFG WELL GW-3 (TEST AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	97	92	80	85	79	74	81	77	82	88	90	92	93	87	78
Flow Rate (scfm)	---	---	---	1	---	---	---	---	---	---	---	---	---	---	---
Methane (%)	55.5	46.5	49.7	43.7	38.4	44.8	44.3	43.7	42	45.8	44.5	54.2	56.1	52.5	50.1
Carbon Dioxide (%)	38.5	36.1	38.9	31.8	25.2	33.9	33.9	33.2	33.5	34.9	35.7	43.8	42.2	41	38.9
Oxygen (%)	0.1	1.2	0.1	3.8	6.8	3.2	4.4	4.4	5.5	3.4	4.4	0.7	0.3	1.3	4.3
Balance (%)	5.9	16.2	11.3	20.7	29.6	18.1	17.4	18.7	19	15.9	15.4	1.3	1.4	5.2	6.7

LFG WELL GW-3A (TEST AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	120	118	112	118	---	---	---	---	---	---	---	---	---	---	---
Flow Rate (scfm)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Methane (%)	51.5	53.1	58.3	54	---	---	---	---	---	---	---	---	---	---	---
Carbon Dioxide (%)	33.3	38.9	41.1	42.9	---	---	---	---	---	---	---	---	---	---	---
Oxygen (%)	3.7	0	0	0	---	---	---	---	---	---	---	---	---	---	---
Balance (%)	11.5	8	0.6	3.1	---	---	---	---	---	---	---	---	---	---	---

LFG WELL GW-4 (TEST AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	97	102	97	90	66	87	98	91	97	100	101	100	103	95	81
Flow Rate (scfm)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Methane (%)	57.3	45.7	53.2	54.8	0.3	51.7	58	57.5	56.7	58	55.2	54.8	57	55.4	55.1
Carbon Dioxide (%)	35.5	35.4	39.1	39.5	3.5	37.8	41.7	41.6	43.3	42	43.8	44.1	43	43.1	42.8
Oxygen (%)	2.7	2.7	1.5	1.1	19.7	1.1	0.1	0	0	0	0.9	0.8	0	0	0
Balance (%)	4.5	16.2	6.2	4.6	76.5	9.4	0.2	0.9	0	0	0.1	0.3	0	1.5	2.1

GW-2A was destroyed during construction activities in March 2003
GW-3A was destroyed during construction activities in January 2003
Access to gas wells was limited due to waste placement activities.

TABLE 4
LANDFILL GAS DATA
(continued)

LFG WELL GW-5 (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	100	102	98	99	100	101	102	103	105	105	109	109	109	107	108
Flow Rate (scfm)	---	37	---	62	---	62	56	58	---	31	32	18	---	19	---
Methane (%)	67.1	52.9	59	58.2	38.8	53.5	55.7	52.4	55.6	54.4	53.5	56.5	58	55	55.6
Carbon Dioxide (%)	32.4	39.3	42.2	40.9	28.6	39.9	43.1	41.1	44.2	42.2	42.9	43.5	42	42.9	43.1
Oxygen (%)	0.3	0.4	0	0.4	6.7	0.1	0.7	0.7	0.2	0.1	0.5	0	0	0	0
Balance (%)	0.2	7.4	0	0.5	25.9	6.5	0.5	5.8	0	3.3	3.1	0	0	2.1	1.3

LFG WELL GW-6 (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	100	100	72	55	---	43	---	66	66	92	90	93	---	98	97
Flow Rate (scfm)	---	7	---	---	---	13	---	---	---	1	---	---	---	---	16
Methane (%)	38.8	46.1	49.4	57.8	---	26.9	---	3.1	24.1	45.3	0.5	15.7	---	58.8	59.8
Carbon Dioxide (%)	27.5	34.7	35.1	34.6	---	16	---	3.9	16.9	31.9	4.1	11	---	41.2	40
Oxygen (%)	6.6	2	3.7	0.4	---	11.6	---	18.8	11.9	3.2	18.7	14.2	---	0	0
Balance (%)	27.1	17.2	11.8	7.2	---	45.5	---	74.2	47.1	19.6	76.7	59.1	---	0	0.2

LFG WELL GW-7 (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	130	120	134	132	131	132	---	---	132	---	---	134	135	134	136
Flow Rate (scfm)	---	---	---	24	23	31	---	---	---	---	---	7	---	10	20
Methane (%)	74.9	49.4	52.1	51.5	50.9	50.1	---	---	54.4	---	---	52	54	50.6	53
Carbon Dioxide (%)	24.4	37.9	41	38.7	27.2	40.6	---	---	44.2	---	---	43.7	44.3	41	42
Oxygen (%)	0	0.6	0	1.3	1	0	---	---	0	---	---	0.1	0.0	0.4	0
Balance (%)	0.7	12.1	6.9	8.5	21	9	---	---	1	---	---	4.2	1.7	8	4.5

LFG WELL GW-8 (TEST AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	125	123	127	126	125	127	128	128	130	130	130	130	131	130	130
Flow Rate (scfm)	---	36	---	50	83	61	59	54	---	---	26	28	27	28	---
Methane (%)	64.4	43.6	53.4	51.3	40.6	53.6	54.7	53.6	58.7	55.1	56.3	55	56	54.6	55.4
Carbon Dioxide (%)	25.1	36.7	41.7	40.3	37.1	40.2	42.2	42	41.3	43.5	43.7	44.9	44	43.6	44.5
Oxygen (%)	0	0	0	0.8	5.3	0.1	0.2	0.6	0	0	0	0	0	0	0
Balance (%)	10.5	19.7	4.9	7.6	17	6.1	2.9	3.8	0	1.4	0	0.1	0	1.8	0.1

Access to gas wells was limited due to waste placement activities.
LFG Well GW-6 sampling ports were destroyed, no measurements taken 9/15/03

TABLE 4
LANDFILL GAS DATA
(continued)

LFG WELL GW-9 (TEST AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	116	121	117	119	118	117	117	116	119	119	120	121	123	122	122
Flow Rate (scfm)	---	---	56	36	---	43	37	34	17	14	18	19	---	18	9
Methane (%)	56.6	46.8	55.3	48.9	26	55.9	55.4	54.9	55.8	54.8	56.9	55.3	56.3	53	55.2
Carbon Dioxide (%)	36.6	37.9	40.4	36.6	19.2	34.5	40.9	41.2	39.9	41.9	42.3	44.5	43.7	41.2	42.1
Oxygen (%)	0	0	0	1.6	11	0.5	0.5	0.3	1.6	0.1	0.2	0.2	0	0.8	0
Balance (%)	6.8	15.3	4.3	12.9	43.8	9.1	3.2	3.6	2.7	3.2	0.6	0	0	5	2.7

LFG WELL GW-10 (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	94	94	92	91	---	89	89	87	88	89	89	89	87	98	97
Flow Rate (scfm)	---	9	---	54	58	---	44	40	21	22	---	30	---	---	20
Methane (%)	26.3	37.5	49.8	54.6	52.3	56.8	54.3	57.3	57	53.3	0.5	52.8	53	55.9	61.1
Carbon Dioxide (%)	19.8	31.6	40.5	39.9	31.8	40.1	43.6	41.7	42.8	40.7	4.7	44.7	45.5	42.9	34.2
Oxygen (%)	9.4	4.2	0	0	4.1	0	0.1	0	0.2	0	18.4	0.3	0	0	0
Balance (%)	44.5	26.7	9.7	5.5	11.8	3.1	2	1	0	6	76.4	2.2	1.5	1.2	4.7

LFG WELL GW-11 (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	110	108	109	111	112	---	---	---	---	---	---	---	---	---	---
Flow Rate (scfm)	---	---	---	54	---	---	---	---	---	---	---	---	---	---	---
Methane (%)	66.4	46.5	53.7	50.7	36	---	---	---	---	---	---	---	---	---	---
Carbon Dioxide (%)	33	36.6	42.1	39.5	24	---	---	---	---	---	---	---	---	---	---
Oxygen (%)	0	1.2	0	1.1	9	---	---	---	---	---	---	---	---	---	---
Balance (%)	0.6	15.7	4.2	8.7	31	---	---	---	---	---	---	---	---	---	---

LFG WELL GW-12 (TEST AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	128	122	124	127	---	72	76	---	---	---	---	---	---	---	---
Flow Rate (scfm)	---	32	---	21	---	51	44	---	---	---	---	---	---	---	---
Methane (%)	65.3	45.5	55.8	51.8	---	55	48.3	---	---	---	---	---	---	---	---
Carbon Dioxide (%)	33.1	35.1	2.9	36.9	---	37.5	48.8	---	---	---	---	---	---	---	---
Oxygen (%)	1.6	2.9	0	1.1	---	0	0	---	---	---	---	---	---	---	---
Balance (%)	0	16.5	1.9	10.2	---	7.5	2.9	---	---	---	---	---	---	---	---

Access to gas wells was limited due to waste placement activities.

TABLE 4
LANDFILL GAS DATA
(continued)

LFG WELL GW-13 (TEST AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	126	120	123	120	---	120	121	---	119	---	---	---	120	80	---
Flow Rate (scfm)	---	7	---	25	---	14	20	---	---	---	---	---	---	---	---
Methane (%)	72.2	48.8	54.8	49.9	---	52.7	54.6	---	54.7	---	---	---	51	50.2	---
Carbon Dioxide (%)	27.4	38.3	43.1	45.2	---	36	41.7	---	42.9	---	---	---	43.6	43.2	---
Oxygen (%)	0	0.9	0	0	---	0.5	0.1	---	0	---	---	---	0.7	0.6	---
Balance (%)	0.4	12	2.1	4.9	---	10.8	3.6	---	2.4	---	---	---	4.7	6	---

LFG WELL GW-14 (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	130	96	---	79	---	---	92	---	95	107	114	114	119	106	103
Flow Rate (scfm)	---	11	---	---	---	---	---	---	1	---	---	---	---	---	10
Methane (%)	42.2	52.8	---	55	---	---	51.1	---	52.1	46.1	52.4	52.3	47.9	45.7	60.4
Carbon Dioxide (%)	29	38.1	---	44.6	---	---	41.9	---	40.7	35.3	42	41.6	38.8	35.8	38.7
Oxygen (%)	5.6	1	---	0	---	---	0.6	---	1.4	3	1.2	1.3	2.9	3.3	0
Balance (%)	23.2	8.1	---	0.4	---	---	6.4	---	5.8	15.6	4.4	4.8	10.4	15.2	0.9

LFG WELL GW-15 (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	92	90	87	76	---	76	82	83	82	89	92	91	91	99	98
Flow Rate (scfm)	---	8	---	14	---	12	---	38	19	---	---	9	---	8	18
Methane (%)	66.5	47.9	50.7	37.8	---	57	55	54	39	50	0.6	38.0	39.3	32.9	60.3
Carbon Dioxide (%)	33.5	38.3	41.2	31.4	---	41	44	42	32	41	5.7	30.9	34.0	27.2	31.4
Oxygen (%)	0	1.3	0.9	5.5	---	0	0	0	6	1	18.2	5.9	4.6	7.3	0.0
Balance (%)	0	12.5	7.2	25.3	---	2	1	4	24	8	75.5	25.2	22.1	32.6	8.3

LFG WELL GW-16 (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	120	116	118	117	117	---	100	91	120	120	121	121	121	118	111
Flow Rate (scfm)	---	---	---	59	64	---	---	---	21	24	18	18	---	---	---
Methane (%)	45.1	46.3	55	52.4	40	---	59	61	56	54	56.9	56.5	56.9	56.7	61.8
Carbon Dioxide (%)	28.6	38	43.5	39	30	---	40	39	44	42	42.9	43.4	43.1	43.1	38.2
Oxygen (%)	5.3	0.8	0	1.8	7	---	0	0	0	0	0	0	0	0	0
Balance (%)	21	14.9	1.5	6.8	24	---	2	0	0	4	0	0	0	0	0

Access to gas wells was limited due to waste placement activities.

TABLE 4
LANDFILL GAS DATA
(continued)

LFG WELL GW-17 (TEST AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	128	126	133	133	---	---	112	---	79	81	---	89	---	60	---
Flow Rate (scfm)	---	12	---	10	---	---	8	---	30	31	---	20	---	---	---
Methane (%)	58.9	47	56.9	51.7	---	---	51	---	49.3	49.6	---	51.6	---	52.0	---
Carbon Dioxide (%)	36.5	36.2	42.6	38	---	---	38	---	48.5	47.7	---	48.0	---	47.4	---
Oxygen (%)	1.5	2.2	0	2	---	---	3	---	0.6	0.1	---	0.4	---	0.1	---
Balance (%)	3.1	14.6	0.5	8.3	---	---	9	---	1.6	2.6	---	0.0	---	2.6	---

LFG WELL GW-18 (TEST AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	140	140	138	---	---	---	---	---	---	---	---	---	---	---	---
Flow Rate (scfm)	---	7	---	---	---	---	---	---	---	---	---	---	---	---	---
Methane (%)	46	53.2	60.8	---	---	---	---	---	---	---	---	---	---	---	---
Carbon Dioxide (%)	28.8	37.4	39.3	---	---	---	---	---	---	---	---	---	---	---	---
Oxygen (%)	6.6	0.9	0	---	---	---	---	---	---	---	---	---	---	---	---
Balance (%)	18.6	8.5	0	---	---	---	---	---	---	---	---	---	---	---	---

LFG WELL GW-19 (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	112	112	---	101	---	---	---	---	---	---	---	---	---	---	---
Flow Rate (scfm)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Methane (%)	65.1	59.6	---	58.9	---	---	---	---	---	---	---	---	---	---	---
Carbon Dioxide (%)	34.7	36.6	---	39.7	---	---	---	---	---	---	---	---	---	---	---
Oxygen (%)	0	0	---	0	---	---	---	---	---	---	---	---	---	---	---
Balance (%)	0.2	3.8	---	1.4	---	---	---	---	---	---	---	---	---	---	---

LFG WELL GW-20 (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	94	92	91	92	90	87	93	91	92	96	97	97	98	101	99
Flow Rate (scfm)	---	---	---	28	38	14	14	3	2	5	---	7	---	8	---
Methane (%)	54.9	51.9	51.9	55.9	56.8	58.4	54.8	55.5	53.7	51.4	0.8	50.7	52.9	55.2	59.4
Carbon Dioxide (%)	36.4	41.4	41.9	43.1	33.9	41.5	44.6	43.1	44.2	43.1	7.0	44.0	45.2	43.7	40.6
Oxygen (%)	2.5	0.4	0.3	0.3	4.8	0	0	0	0.7	0	17.7	0.6	0	0	0
Balance (%)	6.2	6.3	5.9	0.7	4.5	0.1	0.6	1.4	1.4	5.5	74.5	4.7	1.9	1.1	0

GW-2A was destroyed during construction activities in December 2002 and was rebuilt in June 2003.
Access to gas wells was limited due to waste placement activities.

TABLE 4
LANDFILL GAS DATA
(continued)

LFG WELL GW-21 (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	140	140	141	141	---	---	---	---	---	---	---	---	---	---	110
Flow Rate (scfm)	---	33	---	33	---	---	---	---	---	---	---	---	---	---	---
Methane (%)	66.3	52.4	56.5	51	---	---	51	---	---	---	---	---	49.4	---	62.1
Carbon Dioxide (%)	33.5	41	42.2	36.6	---	---	48	---	---	---	---	---	36.5	---	36.8
Oxygen (%)	0	0.1	0	2	---	---	0	---	---	---	---	---	0.3	---	0.0
Balance (%)	0.2	6.5	1.3	10.4	---	---	2	---	---	---	---	---	13.8	---	1.1

LFG WELL GW-22 (TEST AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	138	133	135	139	---	---	73	---	131	136	---	---	---	---	136
Flow Rate (scfm)	---	11	18	47	---	---	66	---	7	---	---	---	---	---	---
Methane (%)	69.4	44.9	58.7	53.5	---	---	55	---	57	55	---	---	---	---	55
Carbon Dioxide (%)	29.7	30.8	40.2	42.6	---	---	41	---	43	42	---	---	---	---	42
Oxygen (%)	0.9	3.7	0	0	---	---	0	---	0	0	---	---	---	---	0
Balance (%)	0	20.6	1.1	3.9	---	---	4	---	0	4	---	---	---	---	4

LFG WELL GW-23 (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	---	120	125	126	---	---	---	---	---	---	---	---	---	---	---
Flow Rate (scfm)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Methane (%)	---	53	59.3	55.5	---	---	---	---	---	---	---	---	---	---	---
Carbon Dioxide (%)	---	36.2	40.2	43.2	---	---	---	---	---	---	---	---	---	---	---
Oxygen (%)	---	1.3	0	0	---	---	---	---	---	---	---	---	---	---	---
Balance (%)	---	9.5	0.5	1.3	---	---	---	---	---	---	---	---	---	---	---

LFG WELL GW-24 (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	108	102	100	103	100	97	101	99	100	103	101	104	105	106	118
Flow Rate (scfm)	---	6	---	21	25	14	11	17	5	5	---	3	---	10	---
Methane (%)	35.1	32.3	52	52.9	48.6	63.7	53.6	52.0	55.8	52.5	1.2	52.0	51.9	55.3	58.0
Carbon Dioxide (%)	25.4	29.8	42.3	42	36.3	32.8	42.1	38.8	44.1	43.1	8.6	46.8	45.3	44.1	41.4
Oxygen (%)	7.3	6.3	0	0.1	3.0	0.6	0.3	1.0	0.1	0.2	17.2	0.7	0	0	0.3
Balance (%)	32.2	31.6	5.7	5	12.1	2.9	4.0	5.7	0	4.2	73.0	0.5	2.8	0.6	0.3

Access to gas wells was limited due to waste placement activities.

TABLE 4
LANDFILL GAS DATA
(continued)

LFG WELL GW-25 (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	120	122	121	122	122	121	---	121	103	91	---	121	121	---	109
Flow Rate (scfm)	---	36	---	27	---	37	---	27	---	---	---	4	---	---	9
Methane (%)	19.1	34.2	55.3	51.3	20	63	---	51.5	56.9	56.5	54.7	54.7	56.5	---	57.4
Carbon Dioxide (%)	12.8	28.6	43.9	39.4	7	31	---	42.8	43.1	41.7	44.3	44.0	43.5	---	36.1
Oxygen (%)	13.1	5.7	0	1.6	16	1	---	0	0	0	0.7	0.4	0	---	0.9
Balance (%)	55	31.5	0.8	7.7	57	5	---	5.7	0	1.8	0.3	0.9	0	---	5.6

LFG WELL GW-26 (TEST AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	139	142	144	146	---	78	---	---	102	102	---	---	---	---	---
Flow Rate (scfm)	---	24	---	22	---	7	---	---	---	---	---	---	---	---	---
Methane (%)	69.5	51.4	56.9	51.3	---	56	---	---	39	47	---	---	---	---	---
Carbon Dioxide (%)	0.1	39.7	41.4	37.8	---	40	---	---	49	50	---	---	---	---	---
Oxygen (%)	0.3	0.3	0	1.8	---	0	---	---	1	0	---	---	---	---	---
Balance (%)	30.1	8.6	1.7	9.1	---	4	---	---	11	3	---	---	---	---	---

LFG WELL GW-27 (TEST AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	131	131	134	129	---	128	---	127	130	129	128	121	---	---	---
Flow Rate (scfm)	---	32	---	51	---	---	---	39	10	---	---	---	---	---	---
Methane (%)	47.4	42.9	59.9	54.3	---	58	---	40.7	59.3	56.0	55.3	50.3	---	---	---
Carbon Dioxide (%)	29.9	32.9	38.5	43.5	---	38	---	46.1	39.0	41.9	43.9	41.7	---	---	---
Oxygen (%)	5.7	4	0	0	---	0	---	1.5	0	0	0	1.4	---	---	---
Balance (%)	17	20.2	1.6	2.2	---	1	---	11.7	1.7	2.1	0.8	6.6	---	---	---

LFG WELL GW-28 (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	130	130	131	134	133	134	134	133	136	135	135	136	137	108	117
Flow Rate (scfm)	---	38	---	32	31	42	35	27	12	16	---	12	---	14	9
Methane (%)	69.2	52.8	57	49.1	58.2	52.2	57.1	54.1	55.1	50.2	1.9	52.0	52.3	55.2	60.3
Carbon Dioxide (%)	29.2	39.1	41.9	36	27.1	35.3	41.1	40.0	42.2	37.0	10.4	42.9	42.1	42.6	31.2
Oxygen (%)	0.2	0.4	0	2.4	7.8	2.0	0.8	0.9	0	1.0	16.6	1.0	0	0	0.0
Balance (%)	1.4	7.7	1.1	12.5	6.9	10.5	1.0	5.0	2.7	11.8	71.1	4.1	5.6	2.2	8.5

Access to gas wells was limited due to waste placement activities.

TABLE 4
LANDFILL GAS DATA
(continued)

LFG WELL GW-29 (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	135	137	138	137	137	136	134	134	131	128	94	133	131	122	112
Flow Rate (scfm)	---	41	---	34	27	48	40	36	---	---	---	26	25	26	---
Methane (%)	65.7	53.2	60.1	57	31.8	68.4	57.9	59.6	62.6	56.6	58.6	56.9	56.7	56.9	30.9
Carbon Dioxide (%)	34.3	38.2	40.1	37.5	14.0	27.9	39.8	40.0	37.4	41.2	41.3	42.8	43.0	42.4	34.1
Oxygen (%)	0	0.5	0	1.4	11.1	1.2	0.7	0	0	0	0	0.2	0	0	17.5
Balance (%)	0	8.1	0	4.1	43.1	2.5	1.6	0.4	0	2.2	0.1	0.1	0.3	0.7	17.5

LFG WELL GW-30 (TEST AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	136	131	130	131	---	132	---	112	132	133	132	129	132	---	104
Flow Rate (scfm)	---	---	---	---	---	16	---	20	---	2	---	---	---	---	---
Methane (%)	79.4	51.8	57.3	53.4	---	61	---	16.3	57.3	49.4	15.2	50.8	53.0	---	59.8
Carbon Dioxide (%)	20.4	38.1	40.4	37.6	---	31	---	49.1	39.8	35.1	27.4	37.4	39.2	---	40.1
Oxygen (%)	0	0.9	0	1.3	---	1	---	3.7	0.9	1.8	10.4	2.1	1.1	---	0
Balance (%)	0.2	9.2	2.3	7.7	---	7	---	30.9	2.0	13.7	47.0	9.7	6.7	---	0.1

LFG WELL GW-31 (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	132	131	135	134	132	131	131	129	131	132	133	132	132	115	119
Flow Rate (scfm)	---	32	---	41	---	45	37	33	18	21	---	---	---	14	10
Methane (%)	66.8	49.9	54.9	51.8	45.3	64.8	54.3	56.0	55.4	52.9	3.5	54.0	53.3	56.1	57.4
Carbon Dioxide (%)	32.8	37.2	41.7	37.9	23.4	34.8	41.5	41.1	42.3	40.3	13.8	43.8	44.2	43.2	36.3
Oxygen (%)	0.2	1.5	0	1.2	8.7	0.4	0.5	0.3	0.4	0.1	15.4	0	0	0	0.7
Balance (%)	0.2	11.4	3.4	9.1	22.6	0	3.7	2.6	1.9	6.7	67.3	2.2	2.5	0.7	5.6

LFG WELL GW-32 (TEST AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	129	126	131	131	---	130	131	131	132	132	132	131	133	113	124
Flow Rate (scfm)	---	27	---	39	---	52	49	39	19	54	---	22	---	14	13
Methane (%)	70.9	50.5	57.3	55.8	42.5	55.4	54.3	56.2	56.4	53.4	7.3	54.0	53.0	53.9	59.3
Carbon Dioxide (%)	28	37.9	40.2	37.6	11.8	36.8	41.9	41.1	41.0	38.8	19.1	42.8	43.5	41.2	40.4
Oxygen (%)	0	0.8	0	1	8.7	0.2	0.3	0.1	0.4	0.2	13.6	0.4	0	0.4	0.3
Balance (%)	1.1	10.8	2.5	5.6	37.0	7.6	3.5	2.6	2.2	7.6	60.0	2.8	3.5	4.5	0

Access to gas wells was limited due to waste placement activities.

TABLE 4
LANDFILL GAS DATA
(continued)

LFG WELL GW-33 (CONTROL AREA)

Parameter	30-Sep-02	9-Oct-02	14-Nov-02	18-Dec-02	27-Jan-03	25-Feb-03	25-Mar-03	17-Apr-03	29-May-03	13-Jun-03	15-Jul-03	13-Aug-03	15-Sep-03	15-Oct-03	13-Nov-03
Temperature (degrees F)	---	120	126	130	129	128	129	129	130	130	130	130	131	133	121
Flow Rate (scfm)	---	43	---	51	62	61	51	44	20	21	---	36	---	18	10
Methane (%)	---	44.3	60.1	55.4	52.6	61.5	58.7	58.1	56.5	54.9	35.0	55.4	54.9	55.6	61.3
Carbon Dioxide (%)	---	30.8	39	37.1	30.7	34.9	40.6	40.4	40.9	39.6	39.9	42.7	42.9	39.3	34.9
Oxygen (%)	---	3.9	0	1.1	4.2	0.5	0.4	0.1	0.6	0.2	4.0	0.4	0	0.3	0
Balance (%)	---	21	0.9	6.4	12.5	3.1	0.3	1.4	2.0	5.3	21.1	1.5	2.2	4.8	3.8

Access to gas wells was limited due to waste placement activities.

TABLE 5
EXAMPLE OF LEACHATE QUALITY DATA
Project XL
King George County Landfill and Recycling Center
King George, Virginia

CELL 1 (CONTROL AREA)

Parameter	Units	27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02	27-Jan-03	24-Feb-03	24-Mar-03	16-Apr-03	14-Jul-03	14-Oct-03
Biological Oxygen Demand	mg/l	103	30	74.7	346	58	1,800	77	52	58.7	201
Chemical Oxygen Demand	mg/l	732	508	778	981	854	5,330	1,350	616	906	1,330
Total Organic Carbon	mg/l	193	88	254	279	260	1,500	175	190	277	331
BOD/COD Ratio	-	0.14	0.06	0.10	0.35	0.07	0.34	0.06	0.08	0.06	0.15
COD/TOC Ratio	-	3.79	5.79	3.06	3.52	3.28	3.55	7.71	3.24	3.27	4.02
Chloride	mg/l	1380	915	1370	1130	1,760	618	801	1,340	2,390	1,740
Sulfate	mg/l	47.3	162	23.5	<5	5.00	50.60	9.40	2.00	9.50	94.60
Nitrate Nitrogen	mg/l as N	<0.05	<0.050	<0.05	<0.05	2.30	0.05	0.05	0.05	0.05	3.20
Ammonia Nitrogen	mg/l as N	0.82	509	1140	539	800	301	418	530	1,380	908
pH	-	7.23	7.02	7.3	7.2	7.10	6.79	7.15	7.22	7.31	7.32

Secondary Parameters	Units	27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02	27-Jan-03	24-Feb-03	24-Mar-03	16-Apr-03	14-Jul-03	14-Oct-03
Arsenic	mg/l	0.037	0.031	0.034	0.036	0.04	0.03	0.03	0.03	0.04	0.06
Barium	mg/l	0.57	0.49	0.52	0.46	0.47	0.52	0.26	0.28	0.31	0.35
Cadmium	mg/l	<0.001	<0.001	<0.001	<0.001	0.00	0.00	0.00	0.00	0.00	0.00
Chromium	mg/l	0.023	0.017	0.046	0.034	0.05	0.03	0.03	0.04	0.05	0.08
Lead	mg/l	<0.005	<0.005	<0.005	<0.005	0.01	0.01	0.01	0.01	0.01	0.01
Mercury	mg/l	<0.0004	<0.0004	<0.0004	<0.0004	0.00	0.00	0.00	0.00	0.00	0.00
Nitrite Nitrogen	mg/L	<0.05	<0.05	<0.05	<0.05	0.05	0.13	0.05	0.05	0.06	0.05
Total Kjeldahl Nitrogen	mg/L	<0.10	293	226	413	772	214	300	390	758	770
Ortho Phosphorus	mg/L	0.59	0.54	0.36	0.48	0.86	0.09	0.55	0.86	1.50	1.60
Potassium	mg/l	383	235	362	308	470	178	258	356	498	557
Selenium	mg/l	<0.01	0.01	<0.01	0.014	0.01	0.01	0.01	0.01	0.01	0.01
Silver	mg/l	<0.05	<0.05	<0.05	<0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Dissolved Solids	mg/L	3880	2570	3910	3780	4,560	4,610	3,040	3,580	4,740	5,110
Total Phosphorus	mg/L	0.87	0.76	1.6	<0.4	0.65	0.68	1.20	1.50	2.20	2.80

TABLE 5
EXAMPLE OF LEACHATE QUALITY DATA
(continued)

CELL 2 (CONTROL AREA)

Parameter		27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02	27-Jan-03	24-Feb-03	24-Mar-03	16-Apr-03	14-Jul-03	14-Oct-03
Biological Oxygen Demand	mg/l	357	462	378	396	1,210	1,600	263	81	120	86.1
Chemical Oxygen Demand	mg/l	1,960	2,050	1,700	1,290	2,480	3,060	1,400	912	1,540	1,540
Total Organic Carbon	mg/l	311	511	396	408	610	822	391	233	429	408
BOD/COD Ratio	-	0.18	0.23	0.22	0.31	0.49	0.52	0.19	0.09	0.08	0.06
COD/TOC Ratio	-	6.30	4.01	4.29	3.16	4.07	3.72	3.58	3.91	3.59	3.77
Chloride	mg/l	1970	1,630	1,680	1240	2,290	900	977	1,220	2,360	1,970
Sulfate	mg/l	<10	89	<5	<10	5.00	60	5.00	5.00	5.00	108.00
Nitrate Nitrogen	mg/l as N	0.19	0.13	<0.05	0.16	0.05	0.15	0.05	0.05	0.13	0.05
Ammonia Nitrogen	mg/l as N	1700	1120	1790	1390	1,040	563	771	842	1,940	1,830
pH	-	6.86	7.44	7.4	7.17	6.83	7.13	7.20	7.09	7.30	7.32

Secondary Parameters	Units	27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02	27-Jan-03	24-Feb-03	24-Mar-03	16-Apr-03	14-Jul-03	14-Oct-03
Arsenic	mg/l	0.038	0.035	0.028	0.02	0.03	0.02	0.02	0.02	0.03	0.03
Barium	mg/l	0.11	0.1	0.22	0.14	0.21	0.14	0.20	0.13	0.13	0.11
Cadmium	mg/l	<0.001	<0.001	<0.001	<0.001	0.00	0.00	0.00	0.00	0.00	0.00
Chromium	mg/l	0.099	0.076	0.065	0.048	0.08	0.03	0.04	0.04	0.09	0.10
Lead	mg/l	<0.005	<0.005	<0.005	<0.005	0.01	0.01	0.01	0.01	0.01	0.04
Mercury	mg/l	<0.0004	<0.0004	<0.0004	<0.0004	0.00	0.00	0.00	0.00	0.00	0.00
Nitrite Nitrogen	mg/L	0.19	0.15	0.17	<0.05	0.07	0.05	0.05	0.05	0.16	0.10
Total Kjeldahl Nitrogen	mg/L	<0.10	965	625	808	897	664	550	548	1,510	1,340
Ortho Phosphorus	mg/L	1	0.39	0.4	0.53	0.72	0.52	0.68	0.87	1.90	2.30
Potassium	mg/l	848	617	557	452	750	319	380	430	714	826
Selenium	mg/l	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.01	0.01	0.01	0.01
Silver	mg/l	<0.05	<0.05	<0.05	<0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Dissolved Solids	mg/L	7230	6600	5900	5190	6,590	4,020	4,120	4,390	6,810	7,800
Total Phosphorus	mg/L	1.8	0.58	1	0.75	0.78	1.40	2.00	2.10	4.50	3.70

TABLE 5
EXAMPLE OF LEACHATE QUALITY DATA
(continued)

CELL 3 (TEST AREA)

Parameter	Units	27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02	27-Jan-03	24-Feb-03	24-Mar-03	16-Apr-03	14-Jul-03	14-Oct-03
Biological Oxygen Demand	mg/l	157	226	65.7	1100	201	944	1,170	200	108	147
Chemical Oxygen Demand	mg/l	1,600	545	440	1,720	1,600	738	2,780	834	1,640	1,330
Total Organic Carbon	mg/l	527	132	137	506	594	737	762	259	489	463
BOD/COD Ratio	-	0.10	0.41	0.15	0.64	0.13	1.28	0.42	0.24	0.07	0.11
COD/TOC Ratio	-	3.04	4.13	3.21	3.40	2.69	1.00	3.65	3.22	3.35	2.87
Chloride	mg/l	1,690	84	660	318	2,360	828	817	999	2,200	1,800
Sulfate	mg/l	28	32	12.5	<10	5	53	2	41	60.1	65.8
Nitrate Nitrogen	mg/l as N	0.061	<0.05	<0.05	0.13	0.05	0.08	0.05	0.05	0.20	0.05
Ammonia Nitrogen	mg/l as N	3,120	15	866	730	1,220	447	420	701	1,180	110
pH	-	7.3	6.18	7.24	6.17	7.20	6.97	7.03	7.27	7.64	7.29

Secondary Parameters	Units	27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02	27-Jan-03	24-Feb-03	24-Mar-03	16-Apr-03	14-Jul-03	14-Oct-03
Arsenic	mg/l	0.034	<0.02	<0.02	<0.02	0.04	0.02	0.02	0.02	0.04	0.04
Barium	mg/l	0.13	0.23	0.3	0.51	0.19	0.28	0.32	0.16	0.13	0.13
Cadmium	mg/l	<0.001	<0.001	<0.001	<0.001	0.00	0.00	0.00	0.00	0.00	0.00
Chromium	mg/l	0.13	0.006	0.019	0.032	0.12	0.04	0.04	0.06	0.13	0.14
Lead	mg/l	<0.005	<0.005	<0.005	0.0076	0.01	0.01	0.01	0.01	0.01	0.01
Mercury	mg/l	<0.0004	<0.0004	<0.0004	<0.0004	0.00	0.00	0.00	0.00	0.00	0.00
Nitrite Nitrogen	mg/L	0.079	<0.05	<0.05	<0.05	0.07	0.05	0.05	0.05	0.20	0.09
Total Kjeldahl Nitrogen	mg/L	<0.10	30.3	129	316	642	316	296	639	1,430	1,170
Ortho Phosphorus	mg/L	3.3	0.27	0.36	<0.04	0.81	0.39	0.51	1.20	2.90	3.30
Potassium	mg/l	853	44.4	246	228	732	225	264	409	750	804
Selenium	mg/l	<0.01	<0.01	<0.01	0.012	0.01	0.01	0.01	0.01	0.01	0.01
Silver	mg/l	<0.05	<0.05	<0.05	<0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Dissolved Solids	mg/L	7010	625	2720	2500	7,060	1,300	4,030	3,940	6,590	7,630
Total Phosphorus	mg/L	5.6	0.29	<0.4	0.36	0.91	0.89	1.70	2.20	10.10	4.00

TABLE 5
EXAMPLE OF LEACHATE QUALITY DATA
(continued)

CELL 4 (CONTROL AREA)

Parameter		27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02	27-Jan-03	24-Feb-03	24-Mar-03	16-Apr-03	14-Jul-03	14-Oct-03
Biological Oxygen Demand	mg/l	77	64	180	166	64	352	126	128	274	83.6
Chemical Oxygen Demand	mg/l	1,390	974	926	627	1,000	882	535	790	979	794
Total Organic Carbon	mg/l	430	271	290	197	355	281	197	236	274	287
BOD/COD Ratio	-	0.06	0.07	0.19	0.26	0.06	0.40	0.24	0.16	0.28	0.11
COD/TOC Ratio	-	3.23	3.59	3.19	3.18	2.82	3.14	2.72	3.35	3.57	2.77
Chloride	mg/l	1,640	964	721	592	1,890	479	568	923	794	938
Sulfate	mg/l	29.5	97.5	<5	<10	5.00	21.90	2.00	2.00	5.00	24.00
Nitrate Nitrogen	mg/l as N	0.05	0.061	<0.05	0.063	1.80	0.05	0.05	0.05	1.90	0.05
Ammonia Nitrogen	mg/l as N	1.4	312	912	725	778	217	291	523	581	690
pH	-	7.27	7.44	7.13	5.51	7.24	7.09	6.92	7.27	7.40	7.31

Secondary Parameters	Units	27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02	27-Jan-03	24-Feb-03	24-Mar-03	16-Apr-03	14-Jul-03	14-Oct-03
Arsenic	mg/l	0.026	0.022	<0.02	<0.02	0.02	0.02	0.02	0.02	0.02	0.02
Barium	mg/l	0.17	0.16	0.21	0.18	0.24	0.19	0.20	0.18	0.20	0.18
Cadmium	mg/l	<0.001	<0.001	<0.001	<0.001	0.00	0.00	0.00	0.00	0.00	0.00
Chromium	mg/l	0.1	0.054	0.04	0.03	0.07	0.02	0.02	0.04	0.04	0.06
Lead	mg/l	<0.005	<0.005	<0.005	0.0053	0.01	0.01	0.01	0.01	0.01	0.01
Mercury	mg/l	<0.0004	<0.0004	<0.0004	<0.0004	0.00	0.00	0.00	0.00	0.00	0.00
Nitrite Nitrogen	mg/L	0.063	<0.05	0.05	<0.05	0.05	0.12	0.05	0.05	0.09	0.06
Total Kjeldahl Nitrogen	mg/L	0.11	582	267	399	700	214	234	417	523	751
Ortho Phosphorus	mg/L	3.8	2.2	0.8	0.76	0.88	0.14	0.63	0.83	0.93	1.90
Potassium	mg/l	618	380	353	277	528	164	225	352	306	448
Selenium	mg/l	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.01	0.01	0.01	0.01
Silver	mg/l	<0.05	<0.05	<0.05	<0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Dissolved Solids	mg/L	6820	3800	3660	3000	4,900	2,020	2,680	3,600	3,280	4,620
Total Phosphorus	mg/L	4.4	2.3	1.2	0.53	0.93	1.00	1.30	2.00	2.10	3.40

TABLE 5
EXAMPLE OF LEACHATE QUALITY DATA
(continued)

LEACHATE STORAGE TANK

Parameter	Units	27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02	27-Jan-03	24-Feb-03	24-Mar-03	16-Apr-03	14-Jul-03	14-Oct-03
Biological Oxygen Demand	mg/l	408	360	987	114	1,800	3,270	2,600	2,070	1,320	292
Chemical Oxygen Demand	mg/l	1,160	719	1,740	1,420	6,280	5,730	5,860	3,680	2,700	1,340
Total Organic Carbon	mg/l	385	412	545	493	1,530	1,340	1,580	1,040	790	277
BOD/COD Ratio	-	0.35	0.50	0.57	0.08	0.29	0.57	0.44	0.56	0.49	0.22
COD/TOC Ratio	-	3.01	1.75	3.19	2.88	4.10	4.28	3.71	3.54	3.42	4.84
Chloride	mg/l	579	555	432	420	1,310	989	862	957	828	926
Sulfate	mg/l	<5	<5	<5	<5	2.00	5.00	5.00	2.00	5.00	14.60
Nitrate Nitrogen	mg/l as N	<0.05	0.061	0.075	<0.01	0.05	0.15	0.05	0.05	0.05	0.058
Ammonia Nitrogen	mg/l as N	0.48	298	781	436	470	458	428	430	734	624
pH	-	6.98	7.2	7.11	7.11	6.99	7.16	7.49	7.30	7.42	7.60

Secondary Parameters	Units	27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02	27-Jan-03	24-Feb-03	24-Mar-03	16-Apr-03	14-Jul-03	14-Oct-03
Arsenic	mg/l	0.026	0.02	<0.02	<0.02	0.03	0.02	0.03	0.02	0.02	0.02
Barium	mg/l	0.31	0.28	0.27	0.32	0.77	0.48	0.55	0.41	0.17	0.12
Cadmium	mg/l	<0.001	<0.001	<0.001	<0.001	0.00	0.00	0.00	0.00	0.00	0.00
Chromium	mg/l	0.021	0.023	0.022	0.02	0.04	0.03	0.04	0.03	0.04	0.03
Lead	mg/l	<0.005	<0.005	<0.005	0.0066	0.01	0.01	0.01	0.01	0.01	0.01
Mercury	mg/l	<0.0004	<0.0004	<0.0004	<0.0004	0.00	0.00	0.00	0.00	0.00	0.00
Nitrite Nitrogen	mg/L	0.085	0.11	0.1	0.24	0.08	0.15	0.05	0.05	0.05	0.05
Total Kjeldahl Nitrogen	mg/L	3.1	3960	201	278	579	434	310	360	531	539
Ortho Phosphorus	mg/L	<0.02	<0.02	<0.02	<0.02	0.39	0.02	0.02	0.02	0.03	0.64
Potassium	mg/l	184	203	175	131	288	272	272	276	328	298
Selenium	mg/l	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.01	0.02	0.01	0.01
Silver	mg/l	<0.05	<0.05	<0.05	<0.05	0.05	0.05	0.05	0.05	0.05	0.05
Total Dissolved Solids	mg/L	2520	2270	2480	2160	5,500	5,000	5,450	4,620	4,070	3,900
Total Phosphorus	mg/L	0.26	0.37	<1	0.23	0.42	0.68	1.00	1.70	1.00	1.20

TABLE 6
SUMMARY OF LEACHATE QUANTITY DATA
Project XL
King George County Landfill and Recycling Center
King George, Virginia

2002

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual Total
Control Area	Pump House #1	Primary	gallons	60,500	16,300	72,500	84,500	30,000	16,400	17,000	25,100	16,200	64,300	87,600	107,900	598,300
		Secondary	gallons	0	0	0	200	0	0	0	200	0	0	0	200	600
	Pump House #2	Primary	gallons	38,000	18,800	37,900	33,400	21,900	17,700	18,900	28,300	27,200	60,500	72,000	91,600	466,200
		Secondary	gallons													0
Test Area	Pump House #3	Primary	gallons	13,500	7,600	22,700	33,800	17,100	10,200	10,500	14,000	12,400	38,700	66,900	66,900	314,300
		Secondary	gallons													0
Control Area	Pump House #4	Primary	gallons	40,400	19,100	60,600	66,700	23,400	30,600	17,100	31,100	20,500	68,200	152,700	178,800	709,200
		Secondary	gallons	0	0	0	0	0	0	0	0	0	0	300	0	300
	Monthly Total		gallons	152,400	61,800	193,700	218,600	92,400	74,900	63,500	98,700	76,300	231,700	379,500	445,400	2,088,900

Note:

This table is based on site records for the King George County Landfill and Recycling Center showing the amount of leachate collected in the primary and secondary leachate collection system. These records were provided by the site manager (Howard Burns).
The test area is represented by Pump House #3 and the control area is represented by Pump Houses #1, 2, and 4.

TABLE 6
SUMMARY OF LEACHATE QUANTITY DATA
(continued)

2003

				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual Total
Control Area	Pump House #1	Primary	gallons	53,400	2,200	0	0	0	0	51,800	55,900	64,000	60,350	67,450		355,100
		Secondary	gallons	0	0	600	0	0	400	0	0	0	0	0		1,000
	Pump House #2	Primary	gallons	63,700	116,550	116,550	69,000	70,950	70,950	49,600	56,600	70,700	84,500	80,700		849,800
		Secondary	gallons													0
Test Area	Pump House #3	Primary	gallons	51,400	105,000	105,000	69,200	83,000	83,000	47,400	49,100	69,250	69,250	73,200		804,800
		Secondary	gallons													0
Control Area	Pump House #4	Primary	gallons	118,700	297,450	297,450	198,300	290,350	390,350	231,200	130,450	178,400	200,100	185,600		2,518,350
		Secondary	gallons	0	0	0	0	400	400	0	0	0	0	0		800
	Monthly Total		gallons	287,200	521,200	519,600	336,500	444,700	545,100	380,000	292,050	382,350	414,200	406,950		4,529,850

Note:

This table is based on site records for the King George County Landfill and Recycling Center showing the amount of leachate collected in the primary and secondary leachate collection system. These records were provided by the site manager (Howard Burns).
The test area is represented by Pump House #3 and the control area is represented by Pump Houses #1, 2, and 4.
The flowmeter in Pump House #1 malfunctioned and was replaced in June 2003

TABLE 7
LIQUID APPLICATION SUMMARY
Project XL
King George County Landfill and Recycling Center
King George County, Virginia

	Liquid Applied by trench (gallons)							Monthly Summary by trench						
Date	1	2	3	4	5	6	Cumulative Total	1	2	3	4	5	6	Monthly Total
11/1/2002	27,971	0	5,990	0	0	0	33,962							
11/2/2002	29,017	7,357	0	0	0	0	70,336							
11/3/2002	0	0	0	0	0	0	70,336							
11/4/2002	40,175	0	0	0	0	0	110,511							
11/5/2002	20,871	0	0	0	0	0	131,381							
11/6/2002	0	0	0	0	0	0	131,381							
11/7/2002	0	0	0	0	0	0	131,381							
11/8/2002	39,108	0	0	0	0	0	170,489							
11/9/2002	0	0	35,540	0	0	0	206,029							
11/10/2002	0	0	0	0	0	0	206,029							
11/11/2002	30,676	5,835	0	0	0	0	242,540							
11/12/2002	0	0	34,137	0	0	0	276,676							
11/13/2002	0	0	31,974	0	0	0	308,650							
11/14/2002	0	0	0	0	0	0	308,650							
11/15/2002	7,561	0	20,904	0	0	0	337,115							
11/16/2002	0	0	0	0	0	0	337,115							
11/17/2002	0	0	0	0	0	0	337,115							
11/18/2002	5,122	0	0	0	0	0	342,237							
11/19/2002	4,983	0	0	0	0	0	347,221							
11/20/2002	0	0	0	0	0	0	347,221							
11/21/2002	0	0	0	0	0	0	347,221							
11/22/2002	0	0	0	0	0	0	347,221							
11/23/2002	0	0	0	0	0	0	347,221							
11/24/2002	0	0	0	0	0	0	347,221							
11/25/2002	0	0	0	0	0	0	347,221							
11/26/2002	0	0	0	35,743	0	0	382,964							
11/27/2002	0	0	0	36,506	0	0	419,470							
11/28/2002	0	0	0	0	0	0	419,470							
11/29/2002	0	0	0	38,811	0	0	458,281							
11/30/2002	0	0	0	23,542	0	0	481,823	205,484	13,192	128,544	134,602	0	0	481,823
12/1/2002	0	0	0	0	0	0	481,823							
12/2/2002	0	0	0	32,799	0	0	514,621							
12/3/2002	26,297	0	0	12,542	0	0	553,460							
12/4/2002	19,878	0	13,444	0	0	0	586,782							
12/5/2002	0	0	0	0	0	0	586,782							
12/6/2002	0	0	0	0	0	0	586,782							
12/7/2002	0	0	0	0	0	0	586,782							
12/8/2002	0	0	0	0	0	0	586,782							
12/9/2002	5,592	0	0	22,930	0	0	615,305							
12/10/2002	0	0	0	31,796	0	0	647,101							
12/11/2002	0	0	0	0	0	0	647,101							
12/12/2002	0	0	0	24,137	0	0	671,237							
12/13/2002	0	0	0	0	39,458	0	710,695							
12/14/2002	0	0	0	0	23,177	0	733,873							
12/15/2002	0	0	0	0	0	0	733,873							
12/16/2002	0	0	0	0	31,103	0	764,976							
12/17/2002	0	0	0	0	37,427	0	802,403							
12/18/2002	0	0	0	0	39,616	0	842,019							
12/19/2002	0	0	0	29,137	38,631	0	909,787							
12/20/2002	0	0	0	0	18,261	0	928,048							
12/21/2002	0	0	0	13,062	48,861	0	989,971							
12/22/2002	0	0	0	0	0	0	989,971							
12/23/2002	6,012	0	0	11,801	56,755	0	1,064,540							
12/24/2002	0	0	0	0	18,540	0	1,083,079							
12/25/2002	0	0	0	0	0	0	1,083,079							
12/26/2002	0	0	0	0	36,631	0	1,119,710							
12/27/2002	0	0	0	0	12,343	0	1,132,053							
12/28/2002	0	0	0	0	0	0	1,132,053							
12/29/2002	0	0	0	0	0	0	1,132,053							
12/30/2002	0	0	0	0	0	0	1,132,053							
12/31/2002	0	0	0	0	0	0	1,132,053	57,779	0	13,444	178,204	400,803	0	650,230
1/1/2003	0	0	0	0	0	0	1,132,053							
1/2/2003	0	0	0	0	0	0	1,132,053							
1/3/2003	0	0	0	0	0	0	1,132,053							

TABLE 7
LIQUID APPLICATION SUMMARY
continued

	Liquid Applied by trench (gallons)							Monthly Summary by trench						
Date	1	2	3	4	5	6	Cumulative Total	1	2	3	4	5	6	Monthly Total
1/4/2003	0	0	0	0	12,875	0	1,144,928							
1/5/2003	0	0	0	0	0	0	1,144,928							
1/6/2003	0	0	0	0	0	0	1,144,928							
1/7/2003	0	0	0	0	0	0	1,144,928							
1/8/2003	0	0	0	0	0	0	1,144,928							
1/9/2003	0	0	0	0	0	0	1,144,928							
1/10/2003	0	0	0	0	0	0	1,144,928							
1/11/2003	0	0	0	0	0	0	1,144,928							
1/12/2003	0	0	0	0	0	0	1,144,928							
1/13/2003	0	0	0	0	0	0	1,144,928							
1/14/2003	0	0	0	0	0	0	1,144,928							
1/15/2003	0	0	0	0	0	0	1,144,928							
1/16/2003	0	0	0	0	0	0	1,144,928							
1/17/2003	0	0	0	0	0	0	1,144,928							
1/18/2003	0	0	0	0	0	0	1,144,928							
1/19/2003	0	0	0	0	0	0	1,144,928							
1/20/2003	0	0	0	0	0	0	1,144,928							
1/21/2003	0	0	0	0	0	84,945	1,229,873							
1/22/2003	0	0	0	0	0	0	1,229,873							
1/23/2003	0	0	0	0	0	0	1,229,873							
1/24/2003	0	0	0	0	0	84,727	1,314,600							
1/25/2003	0	0	0	0	0	99,859	1,414,458							
1/26/2003	0	0	0	0	0	82,669	1,497,127							
1/27/2003	0	0	0	0	0	0	1,497,127							
1/28/2003	0	0	0	0	0	0	1,497,127							
1/29/2003	0	0	0	0	0	0	1,497,127							
1/30/2003	0	0	0	0	0	0	1,497,127							
1/31/2003	0	0	0	0	0	0	1,497,127	0	0	0	0	12,875	352,199	365,074
2/1/2003	0	0	0	0	0	0	1,497,127							
2/2/2003	0	0	0	0	0	0	1,497,127							
2/3/2003	0	0	0	0	0	0	1,497,127							
2/4/2003	0	0	0	0	0	0	1,497,127							
2/5/2003	0	0	0	0	0	0	1,497,127							
2/6/2003	0	0	0	0	0	0	1,497,127							
2/7/2003	0	0	0	0	0	0	1,497,127							
2/8/2003	0	0	0	0	0	0	1,497,127							
2/9/2003	0	0	0	0	0	0	1,497,127							
2/10/2003	0	0	0	0	0	0	1,497,127							
2/11/2003	0	0	0	0	0	0	1,497,127							
2/12/2003	0	0	0	0	0	0	1,497,127							
2/13/2003	0	0	0	0	0	0	1,497,127							
2/14/2003	0	0	0	0	0	0	1,497,127							
2/15/2003	0	0	0	0	0	0	1,497,127							
2/16/2003	0	0	0	0	0	0	1,497,127							
2/17/2003	0	0	0	0	0	0	1,497,127							
2/18/2003	0	0	0	0	0	0	1,497,127							
2/19/2003	0	0	0	0	0	0	1,497,127							
2/20/2003	0	0	0	0	0	75,374	1,572,501							
2/21/2003	0	0	0	0	0	0	1,572,501							
2/22/2003	0	0	0	0	0	0	1,572,501							
2/23/2003	0	0	0	0	0	0	1,572,501							
2/24/2003	0	0	0	0	0	35,799	1,608,300							
2/25/2003	0	0	0	0	0	0	1,608,300							
2/26/2003	0	0	0	0	0	0	1,608,300							
2/27/2003	0	0	0	0	0	0	1,608,300							
2/28/2003	0	0	0	0	0	0	1,608,300	0	0	0	0	0	111,173	111,173
3/1/2003	28,297	0	7,477	0	0	29,194	1,673,269							
3/2/2003	0	0	0	0	0	0	1,673,269							
3/3/2003	0	0	22,096	0	0	77,170	1,772,535							
3/4/2003	28,724	29,947	29,058	7,576	0	0	1,867,839							
3/5/2003	29,952	0	0	29,556	0	0	1,927,348							
3/6/2003	0	0	0	0	0	0	1,927,348							
3/7/2003	0	0	0	0	0	0	1,927,348							
3/8/2003	0	0	0	0	0	0	1,927,348							

TABLE 7
LIQUID APPLICATION SUMMARY
continued

	Liquid Applied by trench (gallons)							Monthly Summary by trench						
Date	1	2	3	4	5	6	Cumulative Total	1	2	3	4	5	6	Monthly Total
3/9/2003	0	0	0	0	0	0	1,927,348							
3/10/2003	0	58,153	0	0	0	0	1,985,501							
3/11/2003	0	0	0	51,444	0	0	2,036,945							
3/12/2003	0	0	0	59,568	0	0	2,096,513							
3/13/2003	21,477	0	0	29,995	0	0	2,147,985							
3/14/2003	0	0	0	0	0	0	2,147,985							
3/15/2003	0	0	0	0	0	0	2,147,985							
3/16/2003	0	0	0	0	0	0	2,147,985							
3/17/2003	0	0	0	0	0	0	2,147,985							
3/18/2003	0	0	0	0	0	0	2,147,985							
3/19/2003	0	0	0	0	0	0	2,147,985							
3/20/2003	0	0	0	0	0	0	2,147,985							
3/21/2003	0	0	0	0	0	0	2,147,985							
3/22/2003	0	0	0	0	0	0	2,147,985							
3/23/2003	0	0	0	0	0	0	2,147,985							
3/24/2003	0	0	0	0	0	0	2,147,985							
3/25/2003	0	0	0	0	0	0	2,147,985							
3/26/2003	0	0	0	0	0	0	2,147,985							
3/27/2003	0	0	0	0	0	0	2,147,985							
3/28/2003	0	0	0	0	0	0	2,147,985							
3/29/2003	0	0	0	0	0	0	2,147,985							
3/30/2003	0	0	0	0	0	0	2,147,985							
3/31/2003	0	0	0	0	0	0	2,147,985	108,451	88,101	58,631	178,139	0	106,365	539,686
4/1/2003	0	0	0	0	0	0	2,147,985							
4/2/2003	0	0	0	0	0	0	2,147,985							
4/3/2003	0	0	0	0	0	0	2,147,985							
4/4/2003	0	0	0	0	0	0	2,147,985							
4/5/2003	0	0	0	0	0	0	2,147,985							
4/6/2003	0	0	0	0	0	0	2,147,985							
4/7/2003	0	0	0	0	0	0	2,147,985							
4/8/2003	0	0	0	0	0	0	2,147,985							
4/9/2003	0	0	0	0	0	0	2,147,985							
4/10/2003	0	0	0	0	0	0	2,147,985							
4/11/2003	0	0	0	0	0	8,026	2,156,012							
4/12/2003	0	0	0	0	0	0	2,156,012							
4/13/2003	0	0	0	0	0	0	2,156,012							
4/14/2003	0	0	0	0	0	0	2,156,012							
4/15/2003	0	0	0	0	0	0	2,156,012							
4/16/2003	0	0	0	0	0	0	2,156,012							
4/17/2003	0	0	0	0	0	0	2,156,012							
4/18/2003	0	0	0	0	0	0	2,156,012							
4/19/2003	0	0	8,312	0	0	0	2,164,324							
4/20/2003	0	0	0	0	0	0	2,164,324							
4/21/2003	0	0	0	0	0	0	2,164,324							
4/22/2003	0	0	0	0	0	0	2,164,324							
4/23/2003	0	0	0	0	0	0	2,164,324							
4/24/2003	0	0	0	0	0	0	2,164,324							
4/25/2003	0	0	0	0	0	0	2,164,324							
4/26/2003	0	0	0	2,753	0	0	2,167,077							
4/27/2003	0	0	0	0	0	0	2,167,077							
4/28/2003	0	0	0	0	0	0	2,167,077							
4/29/2003	0	0	0	0	0	0	2,167,077							
4/30/2003	0	0	0	0	0	0	2,167,077	0	0	8,312	2,753	0	8,026	19,091
5/1/2003	0	0	0	0	0	0	2,167,077							
5/2/2003	0	0	0	0	0	0	2,167,077							
5/3/2003	0	0	0	0	0	0	2,167,077							
5/4/2003	0	0	0	0	0	0	2,167,077							
5/5/2003	0	0	0	0	0	0	2,167,077							
5/6/2003	0	0	0	0	0	0	2,167,077							
5/7/2003	0	0	0	0	0	0	2,167,077							
5/8/2003	0	0	0	0	0	0	2,167,077							
5/9/2003	0	0	0	0	0	0	2,167,077							
5/10/2003	0	0	0	0	0	0	2,167,077							
5/11/2003	0	0	0	0	0	0	2,167,077							

TABLE 7
LIQUID APPLICATION SUMMARY
continued

	Liquid Applied by trench (gallons)							Monthly Summary by trench						
Date	1	2	3	4	5	6	Cumulative Total	1	2	3	4	5	6	Monthly Total
5/12/2003	0	0	0	0	0	35,882	2,202,959							
5/13/2003	30,679	0	0	0	0	0	2,233,638							
5/14/2003	0	14,787	0	13,050	0	0	2,261,475							
5/15/2003	0	0	0	6,842	22,372	0	2,290,688							
5/16/2003	0	0	0	0	0	52,966	2,343,655							
5/17/2003	0	0	0	0	0	0	2,343,655							
5/18/2003	0	0	0	0	0	0	2,343,655							
5/19/2003	7,475	30,309	0	0	0	0	2,381,439							
5/20/2003	0	7,607	0	0	29,746	0	2,418,791							
5/21/2003	0	0	0	0	7,492	29,398	2,455,681							
5/22/2003	0	0	0	29,463	0	7,369	2,492,513							
5/23/2003	0	29,187	0	7,971	0	0	2,529,671							
5/24/2003	0	0	0	0	0	0	2,529,671							
5/25/2003	0	0	0	0	0	0	2,529,671							
5/26/2003	0	7,106	0	0	0	30,072	2,566,849							
5/27/2003	0	23,012	0	0	0	0	2,589,861							
5/28/2003	0	13,540	0	0	24,213	0	2,627,614							
5/29/2003	0	0	0	32,146	7,760	0	2,667,520							
5/30/2003	0	0	0	7,225	0	31,175	2,705,921							
5/31/2003	0	11,616	11,576	22,933	0	11,192	2,763,237	38,153	137,163	11,576	119,631	91,583	198,055	596,161
6/1/2003	0	0	0	0	0	0	2,763,237							
6/2/2003	0	0	0	0	0	0	2,763,237							
6/3/2003	0	0	0	0	0	0	2,763,237							
6/4/2003	0	0	0	0	0	0	2,763,237							
6/5/2003	0	0	0	0	0	0	2,763,237							
6/6/2003	0	0	0	0	0	0	2,763,237							
6/7/2003	0	0	0	0	0	0	2,763,237							
6/8/2003	0	0	0	0	0	0	2,763,237							
6/9/2003	0	0	0	0	0	0	2,763,237							
6/10/2003	0	0	0	0	0	0	2,763,237							
6/11/2003	0	0	0	0	0	0	2,763,237							
6/12/2003	0	0	0	0	0	0	2,763,237							
6/13/2003	0	0	0	0	0	0	2,763,237							
6/14/2003	0	0	0	0	0	0	2,763,237							
6/15/2003	0	0	0	0	0	0	2,763,237							
6/16/2003	0	0	0	0	0	0	2,763,237							
6/17/2003	0	0	0	0	0	0	2,763,237							
6/18/2003	0	0	0	0	0	0	2,763,237							
6/19/2003	0	0	0	0	0	0	2,763,237							
6/20/2003	0	0	0	0	0	0	2,763,237							
6/21/2003	0	0	0	0	0	0	2,763,237							
6/22/2003	0	0	0	0	0	0	2,763,237							
6/23/2003	0	0	0	0	0	0	2,763,237							
6/24/2003	0	0	0	0	0	0	2,763,237							
6/25/2003	0	0	0	0	0	0	2,763,237							
6/26/2003	0	0	0	0	0	0	2,763,237							
6/27/2003	0	0	0	0	0	0	2,763,237							
6/28/2003	0	0	0	0	0	0	2,763,237							
6/29/2003	0	0	0	0	0	0	2,763,237							
6/30/2003	0	0	0	0	0	0	2,763,237	0	0	0	0	0	0	0
7/1/2003	0	0	0	0	0	0	2,763,237							
7/2/2003	0	0	0	0	0	0	2,763,237							
7/3/2003	0	0	0	0	0	0	2,763,237							
7/4/2003	0	0	0	0	0	0	2,763,237							
7/5/2003	0	0	0	0	0	0	2,763,237							
7/6/2003	0	0	0	0	0	0	2,763,237							
7/7/2003	0	0	0	0	0	0	2,763,237							
7/8/2003	0	0	0	0	0	0	2,763,237							
7/9/2003	0	0	0	0	0	0	2,763,237							
7/10/2003	0	0	0	0	0	0	2,763,237							
7/11/2003	0	0	0	0	0	0	2,763,237							
7/12/2003	0	0	0	0	0	0	2,763,237							
7/13/2003	0	0	0	0	0	0	2,763,237							
7/14/2003	0	0	0	0	0	0	2,763,237							

TABLE 7
LIQUID APPLICATION SUMMARY
continued

	Liquid Applied by trench (gallons)							Monthly Summary by trench						
Date	1	2	3	4	5	6	Cumulative Total	1	2	3	4	5	6	Monthly Total
7/15/2003	0	0	0	0	0	0	2,763,237							
7/16/2003	0	0	0	0	0	0	2,763,237							
7/17/2003	0	0	0	0	0	0	2,763,237							
7/18/2003	0	0	0	0	0	0	2,763,237							
7/19/2003	0	0	0	0	0	0	2,763,237							
7/20/2003	0	0	0	0	0	0	2,763,237							
7/21/2003	0	0	0	0	0	0	2,763,237							
7/22/2003	0	0	0	0	0	0	2,763,237							
7/23/2003	0	0	0	0	0	0	2,763,237							
7/24/2003	0	0	0	0	0	0	2,763,237							
7/25/2003	0	0	0	0	0	0	2,763,237							
7/26/2003	0	0	0	0	0	0	2,763,237							
7/27/2003	0	0	0	0	0	0	2,763,237							
7/28/2003	0	0	0	0	0	0	2,763,237							
7/29/2003	0	0	0	0	0	0	2,763,237							
7/30/2003	0	0	0	0	0	0	2,763,237							
7/31/2003	0	0	0	0	0	0	2,763,237	0	0	0	0	0	0	0
8/1/2003	0	0	0	0	0	0	2,763,237							
8/2/2003	0	0	0	0	0	0	2,763,237							
8/3/2003	0	0	0	0	0	0	2,763,237							
8/4/2003	0	0	0	0	0	0	2,763,237							
8/5/2003	0	0	0	0	0	0	2,763,237							
8/6/2003	0	0	0	0	0	0	2,763,237							
8/7/2003	0	0	0	0	0	0	2,763,237							
8/8/2003	0	0	0	0	0	0	2,763,237							
8/9/2003	0	0	0	0	0	0	2,763,237							
8/10/2003	0	0	0	0	0	0	2,763,237							
8/11/2003	0	0	0	0	0	0	2,763,237							
8/12/2003	0	0	0	0	0	0	2,763,237							
8/13/2003	0	0	0	0	0	0	2,763,237							
8/14/2003	0	0	0	0	0	0	2,763,237							
8/15/2003	0	0	0	0	0	0	2,763,237							
8/16/2003	0	0	0	0	0	0	2,763,237							
8/17/2003	0	0	0	0	0	0	2,763,237							
8/18/2003	0	0	0	0	0	0	2,763,237							
8/19/2003	0	0	0	0	0	0	2,763,237							
8/20/2003	0	0	0	0	0	0	2,763,237							
8/21/2003	0	0	0	0	0	0	2,763,237							
8/22/2003	0	0	0	0	0	0	2,763,237							
8/23/2003	0	0	0	0	0	0	2,763,237							
8/24/2003	0	0	0	0	0	0	2,763,237							
8/25/2003	0	0	0	0	0	0	2,763,237							
8/26/2003	0	0	0	0	0	0	2,763,237							
8/27/2003	0	0	0	0	0	0	2,763,237							
8/28/2003	0	0	0	0	0	0	2,763,237							
8/29/2003	0	0	0	0	0	0	2,763,237							
8/30/2003	0	0	0	0	0	0	2,763,237							
8/31/2003	0	0	0	0	0	0	2,763,237	0	0	0	0	0	0	0
9/1/2003	0	0	0	0	0	0	2,763,237							
9/2/2003	0	0	0	0	0	0	2,763,237							
9/3/2003	0	0	0	0	0	0	2,763,237							
9/4/2003	0	0	0	0	0	0	2,763,237							
9/5/2003	0	0	0	0	0	0	2,763,237							
9/6/2003	0	0	0	0	0	0	2,763,237							
9/7/2003	0	0	0	0	0	0	2,763,237							
9/8/2003	0	0	0	0	0	0	2,763,237							
9/9/2003	0	0	0	0	0	0	2,763,237							
9/10/2003	0	0	0	0	0	0	2,763,237							
9/11/2003	0	0	0	0	0	0	2,763,237							
9/12/2003	0	0	0	0	0	0	2,763,237							
9/13/2003	0	0	0	0	0	0	2,763,237							
9/14/2003	0	0	0	0	0	0	2,763,237							
9/15/2003	0	0	0	0	0	0	2,763,237							
9/16/2003	0	0	0	0	0	0	2,763,237							

TABLE 7
LIQUID APPLICATION SUMMARY
continued

	Liquid Applied by trench (gallons)							Monthly Summary by trench						
Date	1	2	3	4	5	6	Cumulative Total	1	2	3	4	5	6	Monthly Total
9/17/2003	0	0	0	0	0	0	2,763,237							
9/18/2003	0	0	0	0	0	0	2,763,237							
9/19/2003	0	0	0	0	0	31693	2,794,930							
9/20/2003	0	0	0	0	0	25201	2,820,131							
9/21/2003	0	0	0	0	0	13672	2,833,803							
9/22/2003	0	1794	0	0	0	0	2,835,597							
9/23/2003	0	0	0	0	0	15062	2,850,659							
9/24/2003	0	0	0	0	0	0	2,850,659							
9/25/2003	0	0	0	0	0	0	2,850,659							
9/26/2003	0	0	0	0	0	0	2,850,659							
9/27/2003	0	0	0	0	0	0	2,850,659							
9/28/2003	0	0	0	0	0	0	2,850,659							
9/29/2003	0	0	0	0	0	0	2,850,659							
9/30/2003	0	0	0	0	0	0	2,850,659	0	1794	0	0	0	85628	87422
10/1/2003	0	0	0	0	0	0	2,850,659							
10/2/2003	0	0	0	0	0	0	2,850,659							
10/3/2003	0	0	0	0	0	0	2,850,659							
10/4/2003	0	0	0	0	0	0	2,850,659							
10/5/2003	0	0	0	0	0	0	2,850,659							
10/6/2003	0	0	0	0	0	0	2,850,659							
10/7/2003	0	0	0	0	0	0	2,850,659							
10/8/2003	0	0	0	0	0	0	2,850,659							
10/9/2003	0	0	0	0	0	0	2,850,659							
10/10/2003	0	0	0	0	0	0	2,850,659							
10/11/2003	0	0	0	0	0	0	2,850,659							
10/12/2003	0	0	0	0	0	0	2,850,659							
10/13/2003	0	0	0	0	0	0	2,850,659							
10/14/2003	0	0	0	0	0	0	2,850,659							
10/15/2003	0	0	0	0	0	0	2,850,659							
10/16/2003	0	0	0	0	0	0	2,850,659							
10/17/2003	0	0	0	0	0	6515	2,857,174							
10/18/2003	0	0	0	0	0	0	2,857,174							
10/19/2003	0	0	0	0	0	0	2,857,174							
10/20/2003	0	0	0	0	0	0	2,857,174							
10/21/2003	0	0	0	0	0	0	2,857,174							
10/22/2003	0	0	0	0	0	0	2,857,174							
10/23/2003	0	0	0	0	0	0	2,857,174							
10/24/2003	0	0	0	0	0	0	2,857,174							
10/25/2003	0	0	0	0	0	0	2,857,174							
10/26/2003	0	0	0	0	0	0	2,857,174							
10/27/2003	0	0	0	0	0	0	2,857,174							
10/28/2003	0	0	0	0	0	0	2,857,174							
10/29/2003	0	0	0	0	0	0	2,857,174							
10/30/2003	0	0	0	0	0	0	2,857,174							
10/31/2003	0	0	0	0	0	0	2,857,174	0	0	0	0	0	6515	6515
11/1/2003	0	0	0	0	0	0	2,857,174							
11/2/2003	0	0	0	0	0	0	2,857,174							
11/3/2003	0	0	0	0	0	0	2,857,174							
11/4/2003	0	0	0	0	0	0	2,857,174							
11/5/2003	0	0	0	0	0	0	2,857,174							
11/6/2003	0	0	0	0	0	0	2,857,174							
11/7/2003	0	0	0	0	0	0	2,857,174							
11/8/2003	0	0	0	0	0	0	2,857,174							
11/9/2003	0	0	0	0	0	0	2,857,174							
11/10/2003	0	0	0	0	0	0	2,857,174							
11/11/2003	0	0	0	0	0	0	2,857,174							
11/12/2003	0	0	0	0	0	0	2,857,174							
11/13/2003	0	0	0	0	0	0	2,857,174							
11/14/2003	0	0	0	0	0	0	2,857,174							
11/15/2003	0	0	0	0	0	0	2,857,174							
11/16/2003	0	0	0	0	0	0	2,857,174							
11/17/2003	0	0	0	0	0	0	2,857,174							
11/18/2003	0	0	0	0	0	0	2,857,174							
11/19/2003	0	0	0	0	0	0	2,857,174							

TABLE 7
LIQUID APPLICATION SUMMARY
continued

	Liquid Applied by trench (gallons)							Monthly Summary by trench						
Date	1	2	3	4	5	6	Cumulative Total	1	2	3	4	5	6	Monthly Total
11/20/2003	0	0	0	0	0	0	2,857,174							
11/21/2003	0	0	0	0	0	0	2,857,174							
11/22/2003	0	0	0	0	0	0	2,857,174							
11/23/2003	0	0	0	0	0	0	2,857,174							
11/24/2003	0	0	0	0	0	0	2,857,174							
11/25/2003	0	0	0	0	0	0	2,857,174							
11/26/2003	0	0	0	0	0	0	2,857,174							
11/27/2003	0	0	0	0	0	0	2,857,174							
11/28/2003	0	0	0	0	0	0	2,857,174							
11/29/2003	0	0	0	0	0	0	2,857,174							
11/30/2003	0	0	0	0	0	0	2,857,174	0	0	0	0	0	0	0
12/1/2003	0	0	0	0	0	0	2,857,174							
12/2/2003	0	0	0	0	0	0	2,857,174							
12/3/2003	0	0	0	0	0	0	2,857,174							
12/4/2003	0	0	0	0	0	0	2,857,174							
12/5/2003	0	0	0	0	0	0	2,857,174							
12/6/2003	0	0	0	0	0	0	2,857,174							
12/7/2003	0	0	0	0	0	0	2,857,174							
12/8/2003	0	0	0	0	0	0	2,857,174							
12/9/2003	0	0	0	0	0	0	2,857,174							
12/10/2003	0	0	0	0	0	0	2,857,174							
12/11/2003	0	0	0	0	0	0	2,857,174							
12/12/2003	0	0	0	0	0	0	2,857,174							
12/13/2003	0	0	0	0	0	0	2,857,174							
12/14/2003	0	0	0	0	0	0	2,857,174							
12/15/2003	0	0	0	0	0	0	2,857,174							
12/16/2003	0	0	0	0	0	0	2,857,174							
12/17/2003	0	0	0	0	0	0	2,857,174							
12/18/2003	0	0	0	0	0	0	2,857,174							
12/19/2003	0	0	0	0	0	0	2,857,174							
12/20/2003	0	0	0	0	0	0	2,857,174							
12/21/2003	0	0	0	0	0	0	2,857,174							
12/22/2003	0	0	0	0	0	0	2,857,174							
12/23/2003	0	0	0	0	0	0	2,857,174							
12/24/2003	0	0	0	0	0	0	2,857,174							
12/25/2003	0	0	0	0	0	0	2,857,174							
12/26/2003	0	0	0	0	0	0	2,857,174							
12/27/2003	0	0	0	0	0	0	2,857,174							
12/28/2003	0	0	0	0	0	0	2,857,174							
12/29/2003	0	0	0	0	0	0	2,857,174							
12/30/2003	0	0	0	0	0	0	2,857,174							
12/31/2003	0	0	0	0	0	0	2,857,174	0	0	0	0	0	0	0

Total per tren	381,897	240,250	214,515	613,328	505,261	867,961	Total Leachate Recirculated	2,857,174
Daily Averag	896	564	504	1,440	1,186	2,037	Total Daily Average	6,707

All units are in gallons

TABLE 8
SUMMARY OF LANDFILL SETTLEMENT DATA
Project XL
King George County Landfill and Recycling Center
King George County, Virginia

Point No.	Northing	Easting	Elev 11/11/2002
Control Area			
2004	6,785,273.540	11,825,080.835	214.14
2005	6,785,281.902	11,825,180.470	210.19
2006	6,785,286.082	11,825,230.287	209.06
2007	6,785,386.598	11,825,231.963	211.26
2008	6,785,373.252	11,825,072.613	213.42
2017	6,785,464.512	11,824,964.606	214.25
2018	6,785,472.923	11,825,064.335	214.09
2019	6,785,481.240	11,825,163.909	212.24
2020	6,785,487.529	11,825,238.699	214.79
2021	6,785,587.234	11,825,230.410	216.24
2022	6,785,580.952	11,825,155.668	215.52
2033	6,785,663.938	11,824,948.007	217.23
2034	6,785,672.348	11,825,047.680	216.58
2035	6,785,680.711	11,825,147.352	214.45
2036	6,785,689.045	11,825,246.985	217.93
2037	6,785,788.719	11,825,238.636	217.97
2038	6,785,790.026	11,825,253.647	218.52
2039	6,785,780.391	11,825,139.023	219.68
2050	6,785,863.427	11,824,931.430	221.82
2051	6,785,871.714	11,825,031.054	221.73
2052	6,785,880.114	11,825,130.756	220.44
2053	6,785,888.458	11,825,230.378	219.50
2054	6,785,891.411	11,825,265.294	218.52
2055	6,785,991.104	11,825,256.952	218.11
2056	6,785,992.789	11,825,276.900	224.73
2057	6,785,979.834	11,825,122.448	224.14
2068	6,786,062.852	11,824,914.813	N/A
2069	6,786,071.068	11,825,014.403	224.15
2070	6,786,079.485	11,825,114.077	221.38
2071	6,786,087.793	11,825,213.694	219.70
2072	6,786,094.066	11,825,288.420	223.36
2073	6,786,193.636	11,825,280.010	222.96
2074	6,786,195.259	11,825,299.912	224.44
2075	6,786,294.827	11,825,291.503	224.07
2076	6,786,295.215	11,825,296.486	222.78
2077	6,786,298.125	11,825,331.369	225.17
Test Area			
2000	6,785,240.088	11,824,682.224	213.49
2001	6,785,248.456	11,824,781.930	212.98
2002	6,785,256.812	11,824,881.506	214.76

TABLE 8
SUMMARY OF LANDFILL SETTLEMENT DATA
(continued)

Point No.	Northing	Easting	Elev 11/11/2002
2003	6,785,265.180	11,824,981.217	211.83
2009	6,785,364.886	11,824,972.951	212.76
2010	6,785,356.487	11,824,873.240	215.54
2011	6,785,348.144	11,824,773.755	215.04
2012	6,785,348.134	11,824,773.630	216.14
2013	6,785,339.845	11,824,674.019	217.27
2014	6,785,439.424	11,824,665.653	216.17
2015	6,785,447.827	11,824,765.325	213.64
2016	6,785,456.211	11,824,865.005	213.01
2023	6,785,572.591	11,825,056.004	213.57
2024	6,785,564.236	11,824,956.388	215.79
2025	6,785,555.898	11,824,856.730	217.20
2026	6,785,547.534	11,824,757.074	218.14
2027	6,785,539.183	11,824,657.418	218.13
2028	6,785,537.109	11,824,632.498	219.30
2029	6,785,636.758	11,824,624.140	219.91
2030	6,785,638.817	11,824,649.053	219.66
2031	6,785,647.264	11,824,748.715	218.54
2032	6,785,655.574	11,824,848.362	216.32
2040	6,785,772.064	11,825,039.413	219.10
2041	6,785,763.606	11,824,939.696	219.18
2042	6,785,755.305	11,824,840.099	221.45
2043	6,785,746.963	11,824,740.458	220.63
2044	6,785,738.644	11,824,640.796	219.94
2045	6,785,734.462	11,824,590.978	221.48
2046	6,785,834.070	11,824,582.620	221.53
2047	6,785,838.299	11,824,632.437	222.60
2048	6,785,846.689	11,824,732.115	220.37
2049	6,785,854.908	11,824,831.718	221.17
2058	6,785,971.553	11,825,022.844	223.06
2059	6,785,963.148	11,824,923.161	223.00
2060	6,785,954.797	11,824,823.503	224.64
2061	6,785,946.396	11,824,723.855	224.92
2062	6,785,938.014	11,824,624.196	224.32
2063	6,785,931.278	11,824,544.488	231.42
2064	6,786,030.993	11,824,536.111	226.52
2065	6,786,037.774	11,824,615.832	225.65
2066	6,786,046.102	11,824,715.479	224.16
2067	6,786,054.381	11,824,815.140	225.35

TABLE 9
RAINFALL DATA SUMMARY
Project XL
King George County Landfill and Recycling Center
King George County, Virginia

Month	Average Precipication	2003 Precipitation	Departure from Normal
January	3.3	1.84	-1.46
February	3.05	7.14	4.09
March	4.01	4.98	0.97
April	3.1	3.51	0.41
May	3.78	8.24	4.46
June	3.63	3.7	0.07
July	4.11	2.54	-1.57
August	3.68	3.95	0.27
September	3.66	4.48	0.82
October	3.47	2.12	-1.35
November	3.25	4.37	1.12
December	3.39	4.76	1.37
Total	42.42	51.63	9.2

Note: The totals for 2003 precipication and departure from normal are for the year to date.
Rainfall data is for Quantico, Virginia.

TABLE 10
SUMMARY OF WASTE CHARACTERIZATION DATA
Project XL
King George County Landfill and Recycling Center
King George County, Virginia

	Sample Date	Location	Depth (ft)	Moisture (%)	VS (%)	Cellulose (%)	Lignin (%)	Cell/Lig Ratio	pH (Field)	BMP (mL/g)
Control Area	8/2/2001	Control 1	0-15	46.79	54.93	34.07	16.98	2.01	6.5	65.98
					55.95	34.58	15.50	2.23		55.33
					54.61					61.81
	8/2/2001	Control 1	15-30	38.83	36.15	35.77	17.40	2.06	7.1	61.36
					51.33	39.24	14.40	2.73		65.39
					47.20					56.84
	8/2/2001	Control 1	30-45	24.00	47.33	28.92	14.60	1.98	6.5	47.28
					43.58	34.10	16.10	2.12		60.02
					43.46					45.69
	8/2/2001	Control 1	45-55	31.63	50.48	31.33	20.60	1.52	5.9	56.82
					38.85	31.36	20.20	1.55		53.45
					39.56					49.90
	8/2/2001	Control 1	55-70	26.19	49.18	37.83	15.50	2.44	5.4	60.60
					56.22	33.82	16.30	2.07		49.01
					51.10					63.11
	8/2/2001	Control 2	0-15	26.87	51.70	28.13	16.60	1.69	6.8	66.89
					54.71	30.31	18.40	1.65		63.09
					54.23					70.96
	8/2/2001	Control 2	15-30	37.94	70.30	37.24	14.50	2.57	6.8	54.11
					72.41	33.80	14.95	2.26		67.40
					72.29					52.77
	8/3/2001	Control 2	30-45	34.14	66.71	40.00	17.50	2.29	5.6	41.72
					67.42	41.51	17.90	2.32		50.13
					65.93					59.66
	8/3/2001	Control 2	45-60	25.74	43.16	31.34	16.03	1.96	5.7	44.21
					36.85	30.31	14.27	2.12		44.92
					42.51					52.92
	8/3/2001	Control 2	60-70	30.99	63.42	38.31	19.20	2.00	5.8	60.29
					68.24	38.87	20.20	1.92		62.82
					64.19					58.47
Test Area	8/1/2001	Bio 1	0-15	43.24	37.92	41.54	15.10	2.75	6.2	54.23
					42.52	29.56	14.80	2.00		52.86
					40.81					55.11
	8/1/2001	Bio 1	15-30	33.22	59.11	30.16	15.90	1.90	6.3	59.65
					56.11	31.50	19.60	1.61		59.43
					55.61					59.11
	8/1/2001	Bio 1	30-45	29.98	84.09	46.36	22.80	2.03	6.7	58.09
					86.16	44.05	21.60	2.04		59.01
					85.87					63.08
	8/1/2001	Bio 1	45-60	29.57	71.82	42.96	19.80	2.17	6.7	68.43
					70.59	41.52	20.00	2.08		69.13
					69.91					68.51
	8/1/2001	Bio 1	60-75	28.40	76.52	43.71	16.50	2.65	6.5	65.75
					73.66	47.18	16.00	2.95		64.50
					75.50					65.72
	7/31/2001	Bio 2	0-15	47.55	66.33	38.17	22.80	1.67	6.3	56.99
					67.31	35.99	23.25	1.55		59.11
					68.67					61.44

TABLE 10
SUMMARY OF WASTE CHARACTERIZATION DATA
continued

	Sample Date	Location	Depth (ft)	Moisture (%)	VS (%)	Cellulose (%)	Lignin (%)	Cell/Lig Ratio	pH (Field)	BMP (mL/g)
Test Area	7/31/2001	Bio 2	15-30	46.26	65.61	31.50	23.28	1.35	5.8	55.19
					63.50	34.17	21.10	1.62		55.45
					65.55					54.29
	7/31/2001	Bio 2	30-45	39.97	53.11	31.42	19.94	1.58	6.6	51.14
					57.05	39.49	22.94	1.72		49.98
					54.32					53.29
	7/31/2001	Bio 2	45-60	45.44	71.56	39.00	23.06	1.69	5.6	67.27
					72.01	32.99	23.91	1.38		67.47
					70.82					66.77
	7/31/2001	Bio 2	60-75	40.19	69.23	37.46	25.85	1.45	5.4	61.65
					71.53	41.60	25.56	1.63		60.32
					71.75					60.20
	7/31/2001	Bio 3	0-15	30.70	71.60	44.34	15.50	2.86	5.4	65.01
					72.68	52.14	15.00	3.48		58.48
					71.80					62.03
	7/31/2001	Bio 3	15-30	35.71	61.58	34.48	14.70	2.35	5.8	53.58
					57.21	35.86	14.10	2.54		53.53
					58.64					54.16
	8/1/2001	Bio 3	30-45	39.86	55.12	26.07	23.54	1.11	8.3	54.72
					51.37	26.51	29.46	0.90		55.69
					52.84					51.44
	8/1/2001	Bio 3	45-60	43.87	69.44	37.02	19.63	1.89	7.6	62.05
					72.26	33.94	21.22	1.60		62.58
					65.85					63.07
	8/1/2001	Bio 3	60-75	35.18	49.21	16.72	19.71	0.85	5.8	54.91
					44.06	21.16	21.33	0.99		57.04
					43.13					57.49

TABLE 11

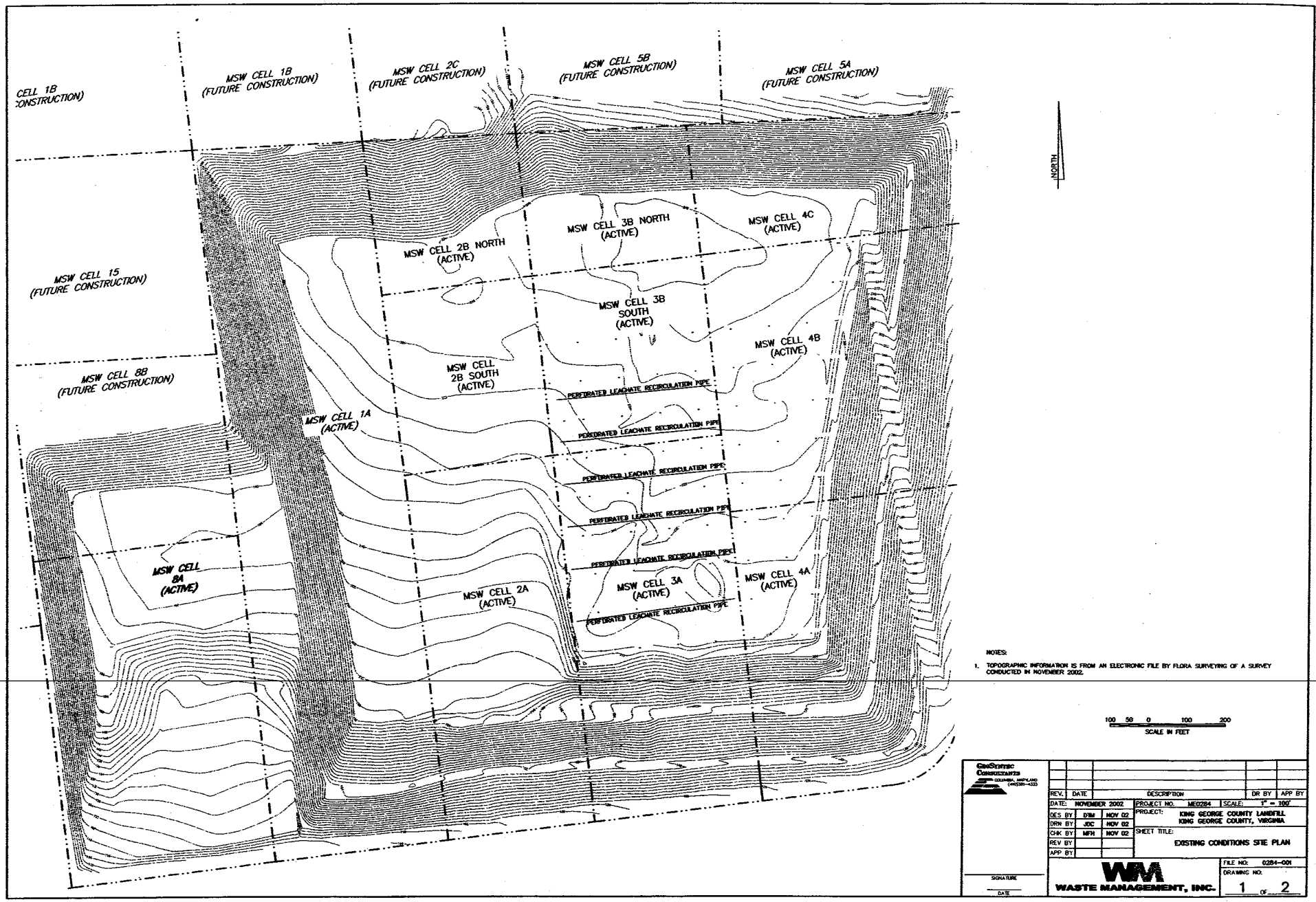
2004 MONITORING ACTIVITIES

Project XL

King George County Landfill and Recycling Center

King George County, Virginia

	Monitoring Parameters	Responsible Party	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1. LEACHATE	Chemical parameters measured on site	WM personnel	X						X					
	Physical parameters measured on site	WM personnel	X	X	X	X	X	X	X	X	X	X	X	X
	Chemical parameters sampled on site from test area	Sampled by subcontractor, tested offsite by Geochemical	X						X					
	Chemical parameters sampled on site from storage tanks	Sampled by subcontractor, tested offsite by Geochemical	X						X					
2. LANDFILL GAS	Landfill gas composition measured on site	WM personnel	X	X	X	X	X	X	X	X	X	X	X	X
	Physical parameters measured on site	WM personnel	X	X	X	X	X	X	X	X	X	X	X	X
	Chemical parameters	WM personnel, testing by subcontractor	X						X					
	Surface landfill gas measured on site	Subcontractor	X						X					
3. SOLID WASTE	Survey, on site	Subcontractor	X			X			X			X		
	Solid waste stabilization and decomposition measured on site	WM personnel											X	



NOTES:

1. TOPOGRAPHIC INFORMATION IS FROM AN ELECTRONIC FILE BY FLORA SURVEYING OF A SURVEY CONDUCTED IN NOVEMBER 2002.

100 50 0 100 200
SCALE IN FEET

GeoSyntec Consultants
COLUMBIA, MARYLAND

REV.	DATE	DESCRIPTION	DR BY	APP BY

DATE:	NOVEMBER 2002	PROJECT NO.	ME0284	SCALE: 1" = 100'
DES BY	DTM	NOV 02	PROJECT:	KING GEORGE COUNTY LANDFILL KING GEORGE COUNTY, VIRGINIA
DRN BY	JDC	NOV 02		
CHK BY	MFH	NOV 02	SHEET TITLE:	EXISTING CONDITIONS SITE PLAN
REV BY				
APP BY				

SIGNATURE

DATE

WASTE MANAGEMENT, INC.

FILE NO: 0284-001

DRAWING NO: 1 OF 2

P:\cadd\0284-king g\0284-001.dwg Thu May 08 10:06:14 2003 GeoSyntec Consultants, MD (DTM)

FIGURE 2
LIQUID APPLIED TO LANDFILL - CUMULATIVE
Project XL
King George County Landfill and Recycling Center
King George, Virginia

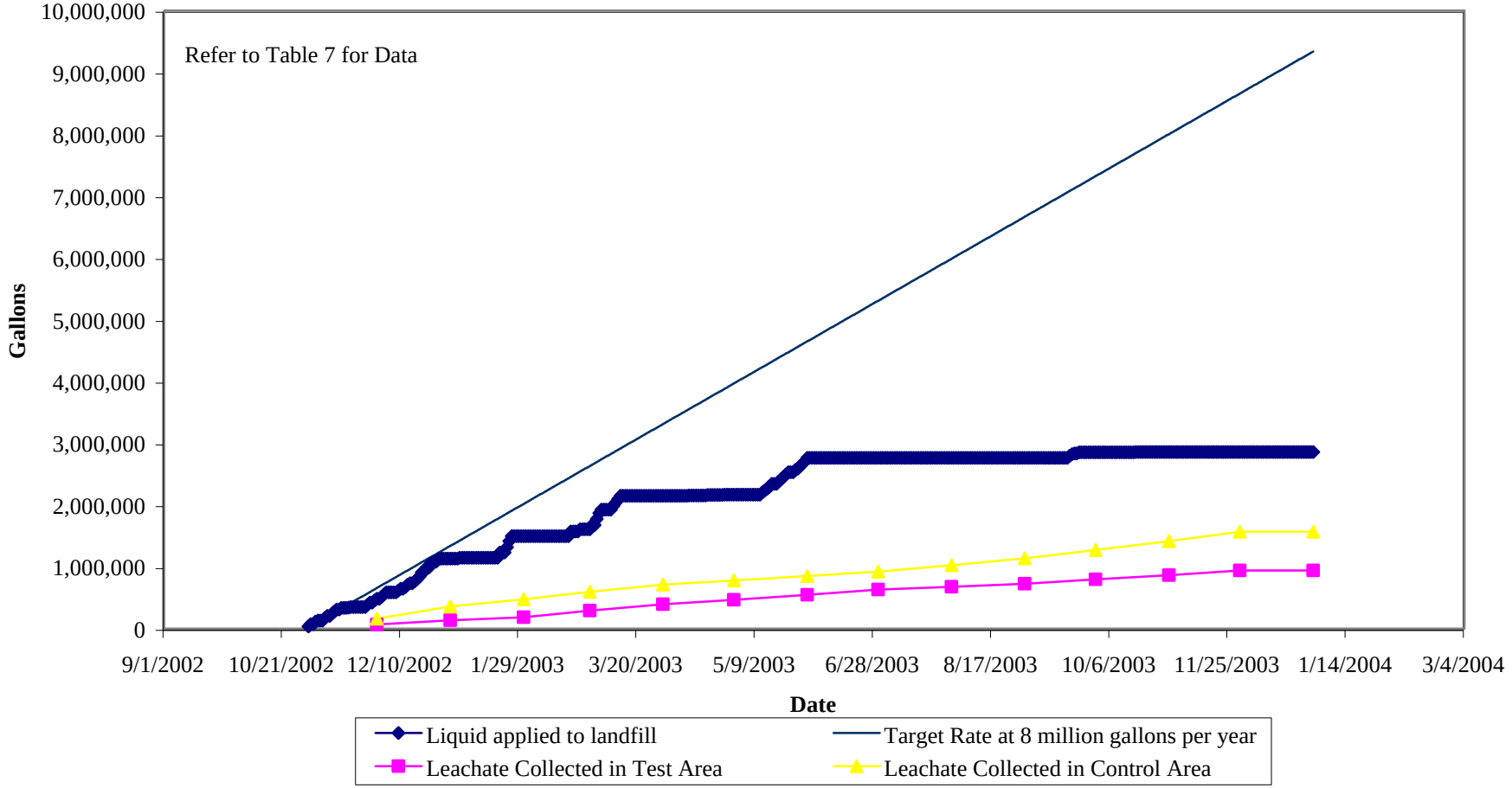


FIGURE 3
BOD/COD RATIO
Project XL
King George County Landfill and Recycling Center
King George, Virginia

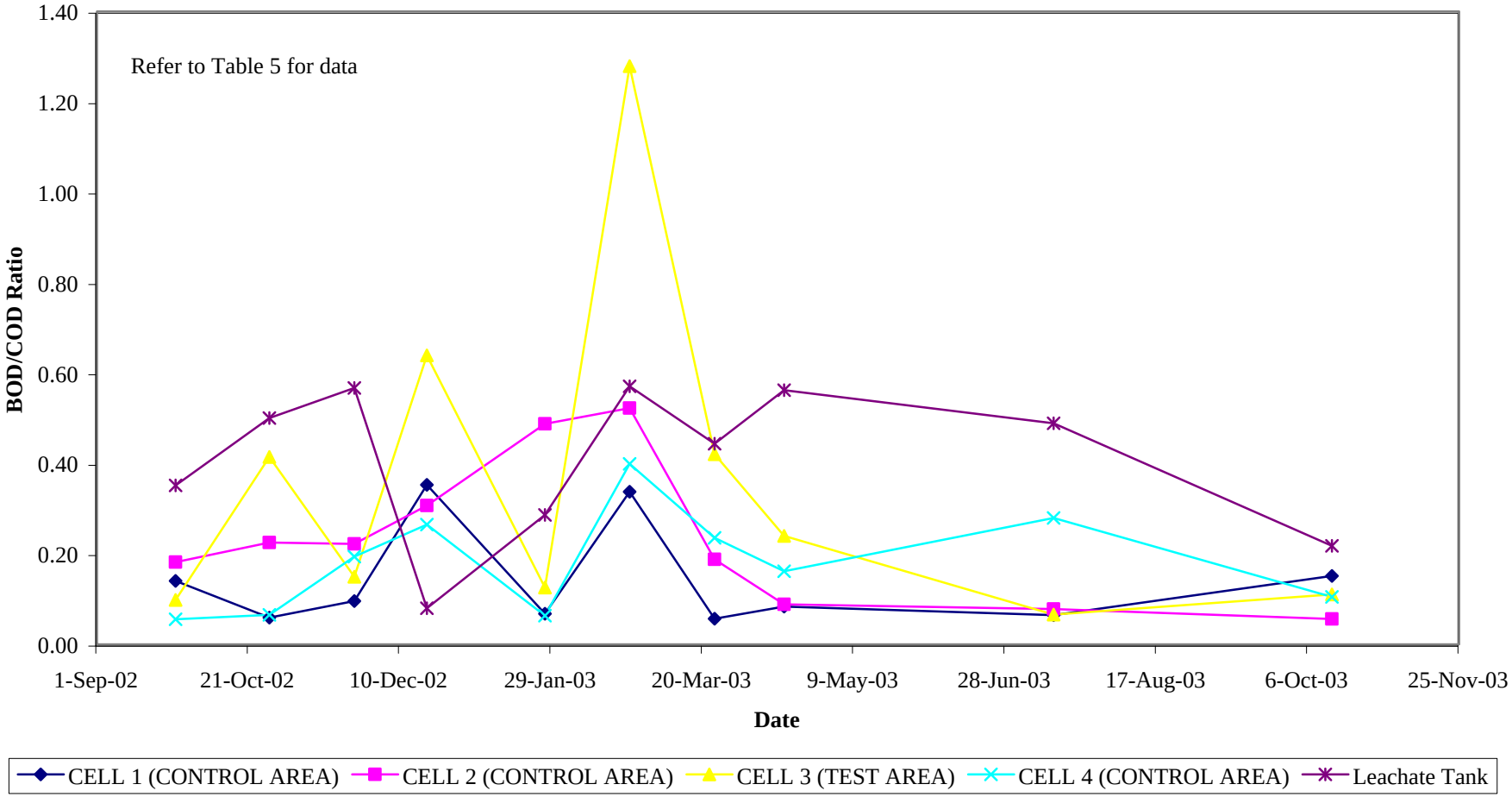


FIGURE 4
COD/TOC RATIO
Project XL
King George County Landfill and Recycling Center
King George, Virginia

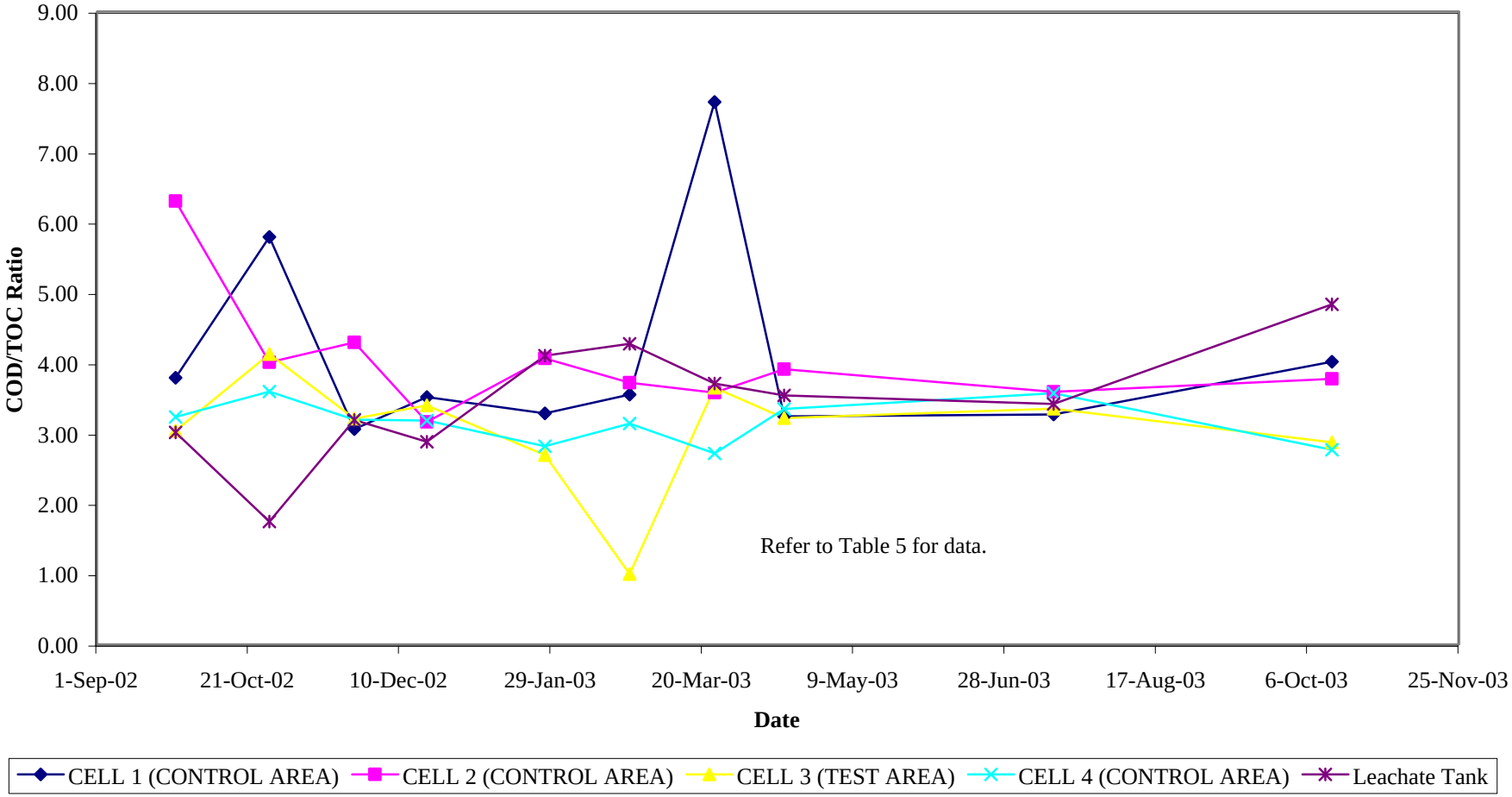


FIGURE 5
CHLORIDE CONCENTRATION
Project XL
King George County Landfill and Recycling Center
King George, Virginia

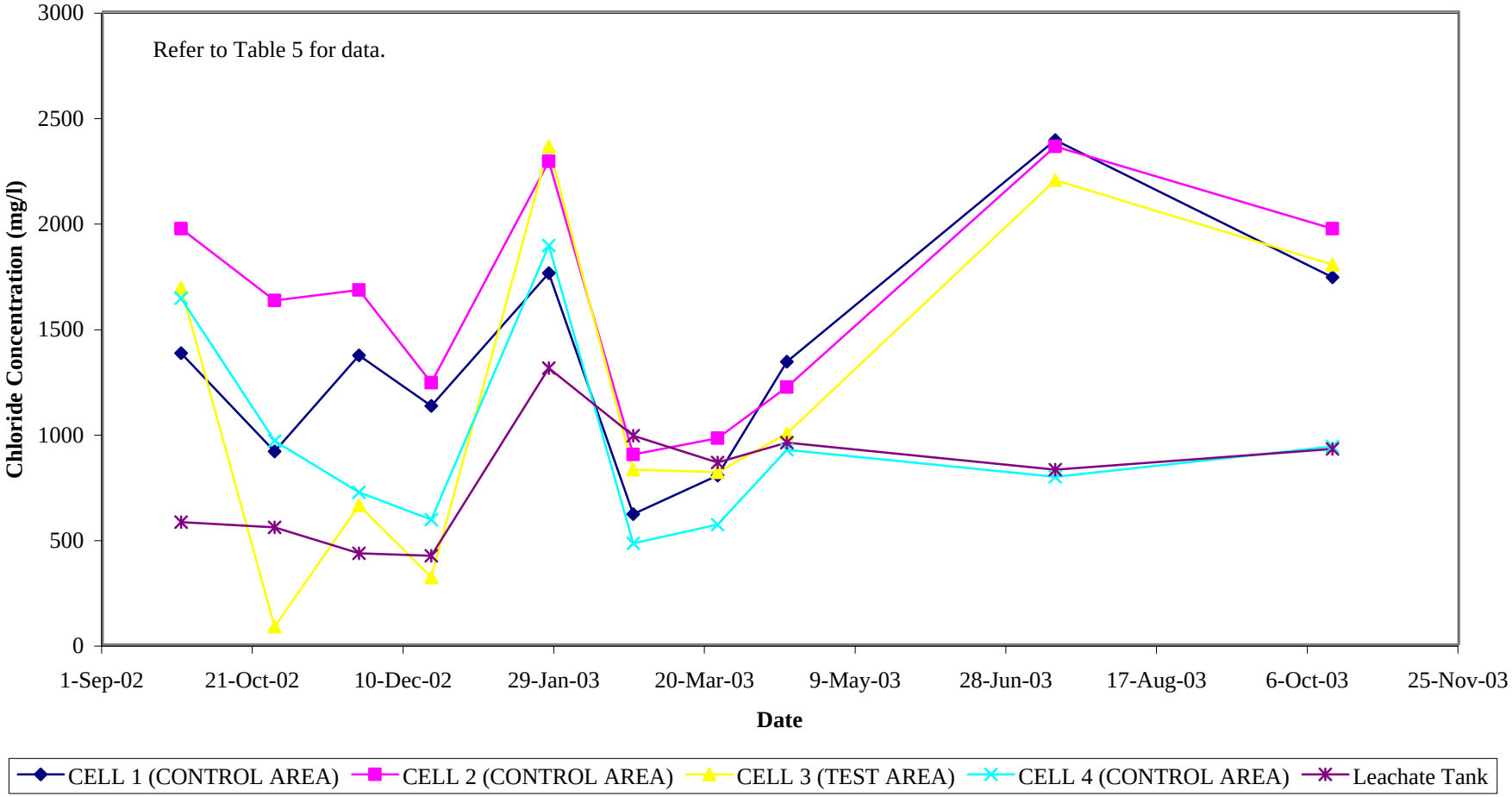


FIGURE 6
NITRATE NITROGEN CONCENTRATION
Project XL
King George County Landfill and Recycling Center
King George, Virginia

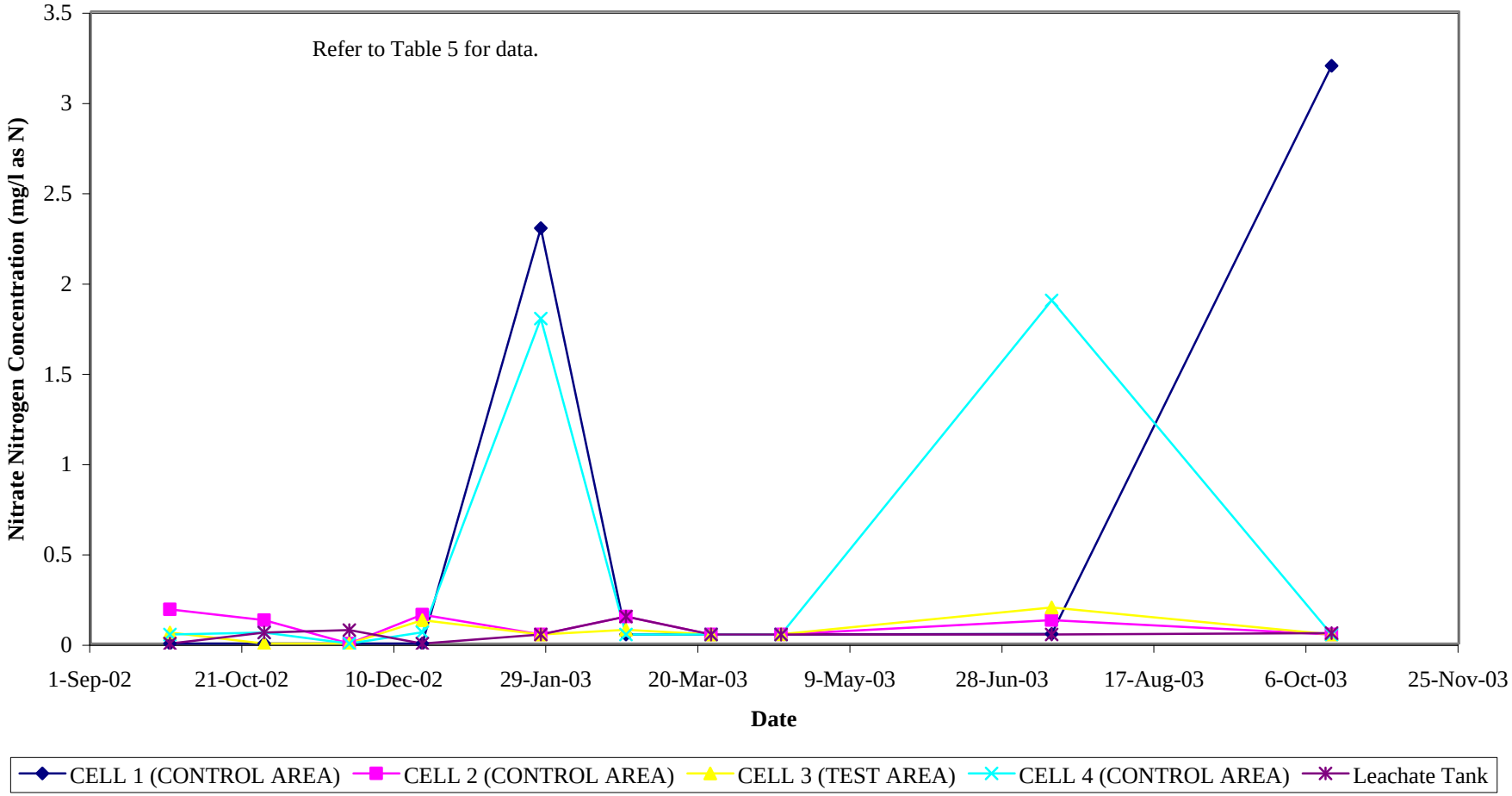


FIGURE 7
AMMONIA NITROGEN CONCENTRATION
Project XL
King George County Landfill and Recycling Center
King George, Virginia

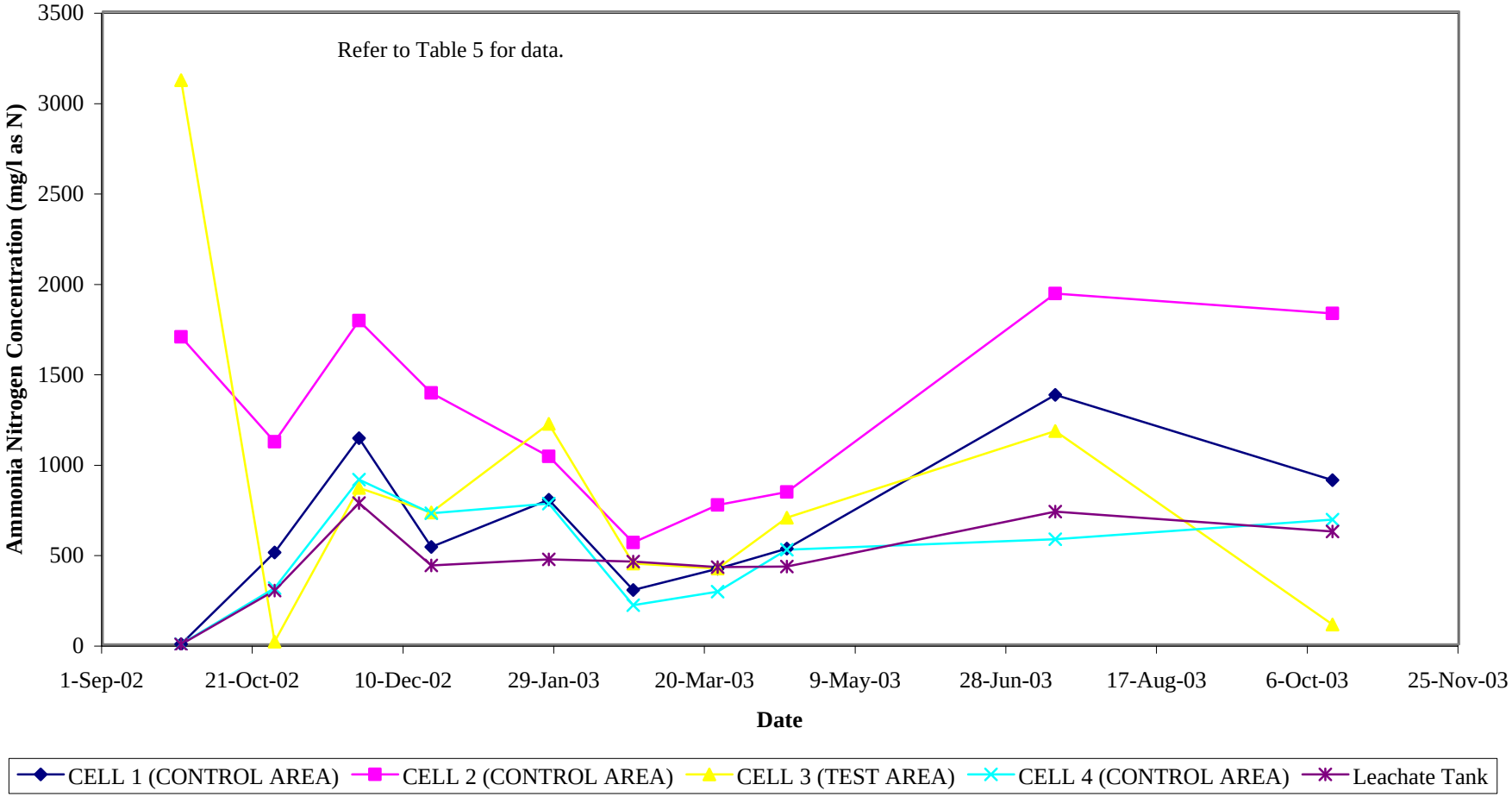


FIGURE 8
Variation in pH
Project XL
King George County Landfill and Recycling Center
King George, Virginia

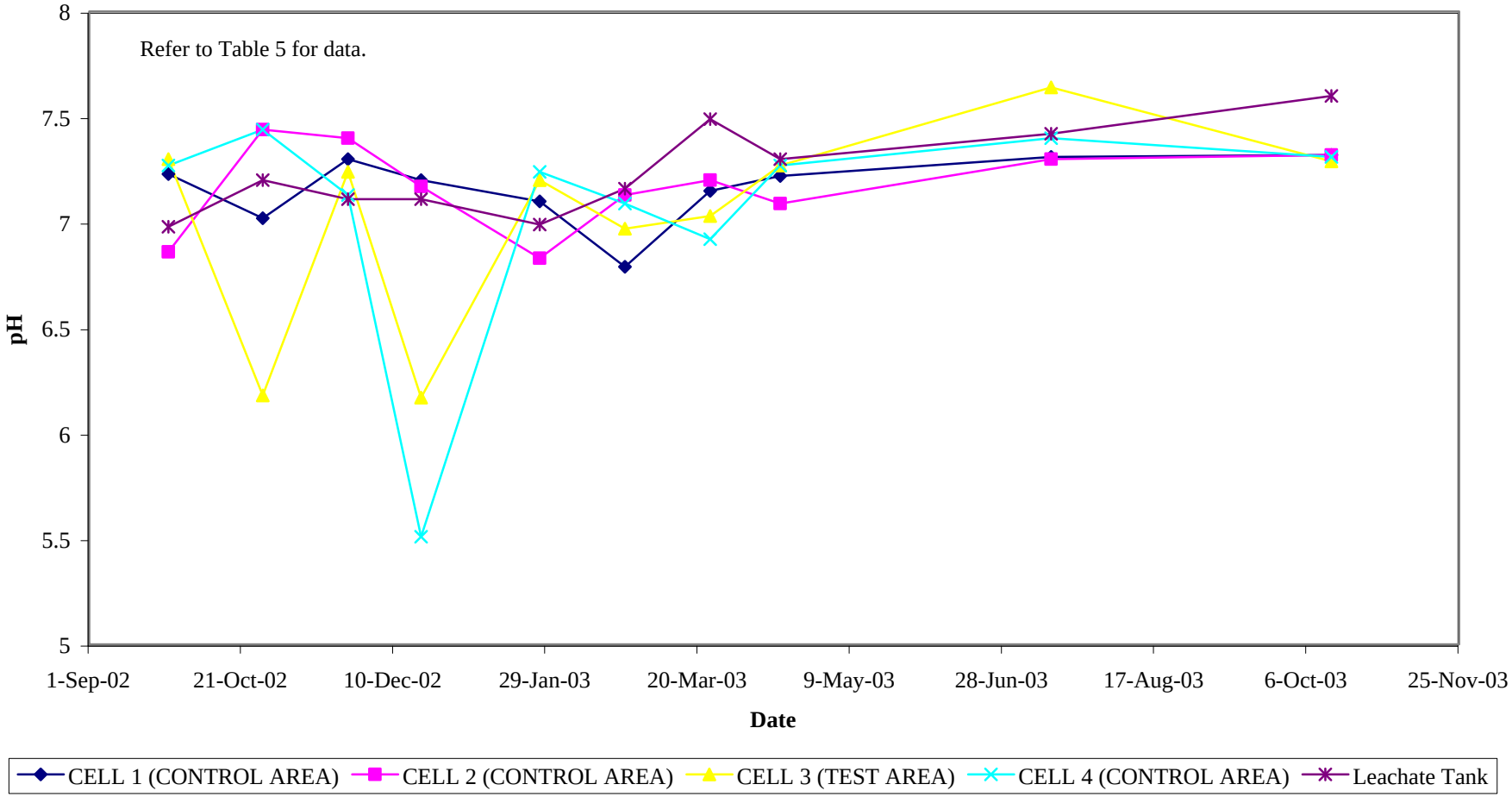


FIGURE 9
LANDFILL GAS QUANTITY DATA
Project XL
King George County Landfill and Recycling Center
King George, Virginia

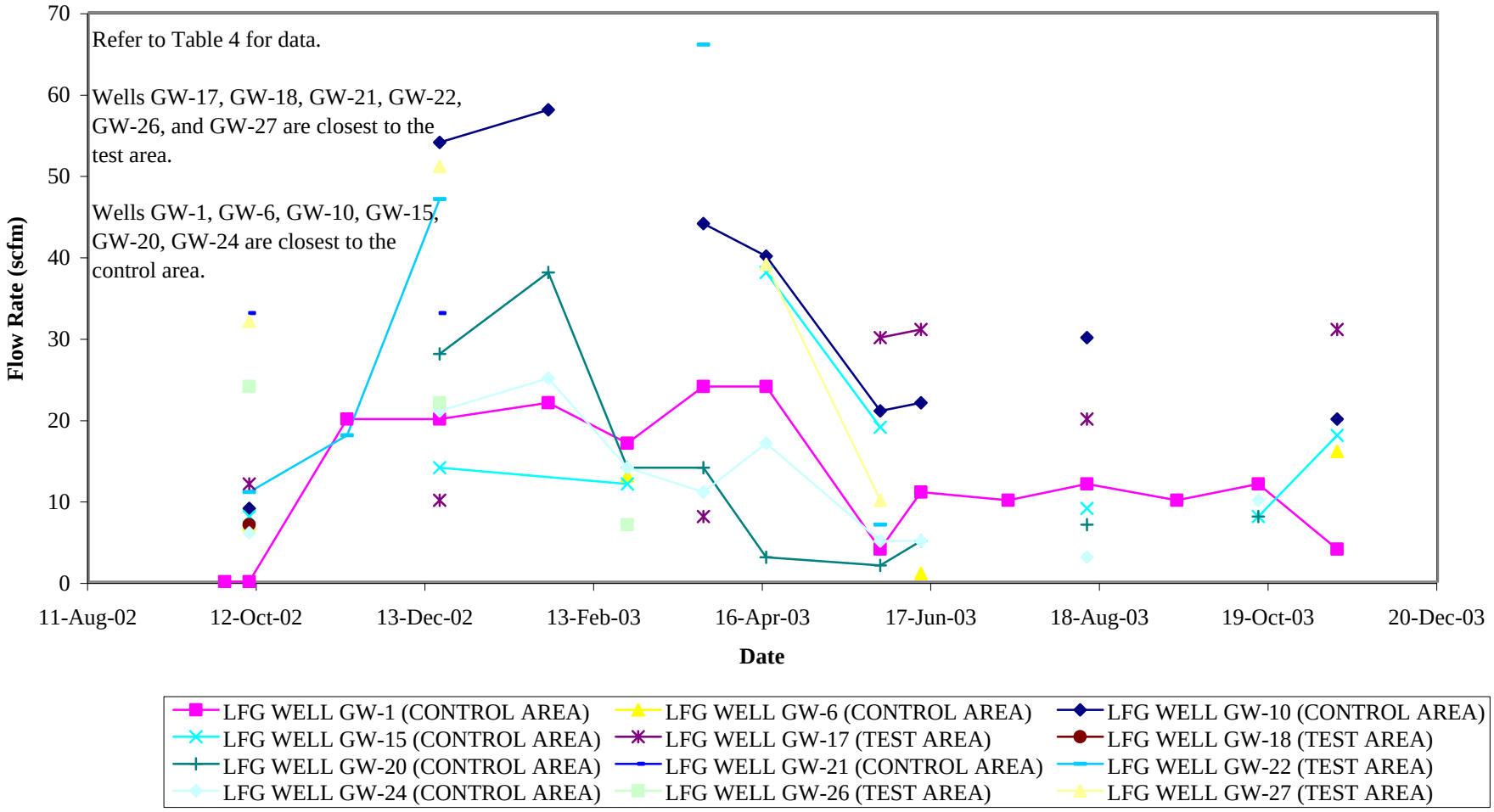
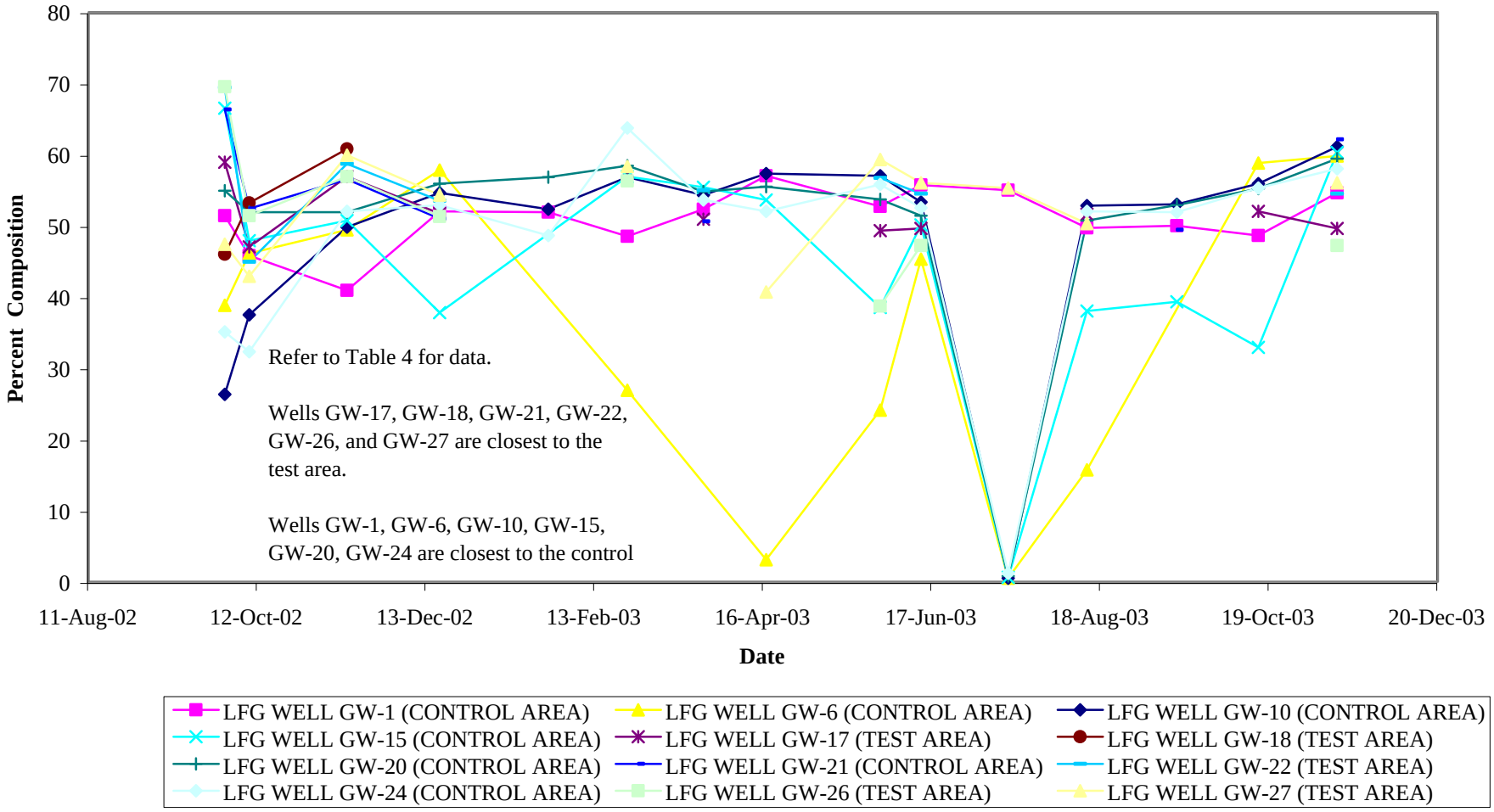
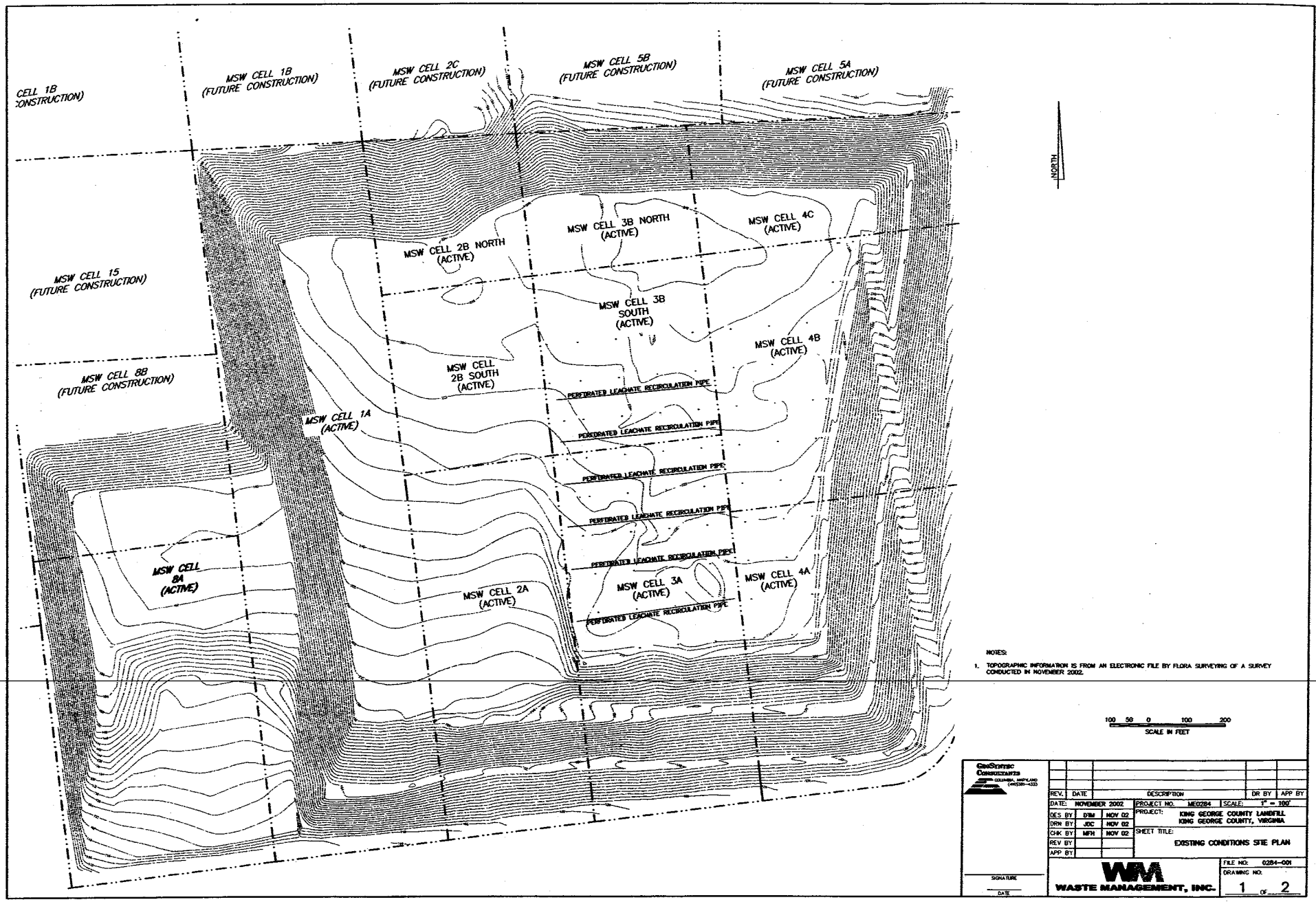


FIGURE 10
LANDFILL GAS QUALITY DATA - METHANE
Project XL
King George County Landfill and Recycling Center
King George, Virginia





NOTES:

1. TOPOGRAPHIC INFORMATION IS FROM AN ELECTRONIC FILE BY FLORA SURVEYING OF A SURVEY CONDUCTED IN NOVEMBER 2002.

100 50 0 100 200
SCALE IN FEET

GeoSyntec Consultants
COLUMBIA, MARYLAND

REV.	DATE	DESCRIPTION	DR BY	APP BY

DATE:	NOVEMBER 2002	PROJECT NO.	ME0284	SCALE: 1" = 100'
DES BY	DTM	NOV 02	PROJECT:	KING GEORGE COUNTY LANDFILL KING GEORGE COUNTY, VIRGINIA
DRN BY	JDC	NOV 02		
CHK BY	MFH	NOV 02	SHEET TITLE:	EXISTING CONDITIONS SITE PLAN
REV BY				
APP BY				

SIGNATURE

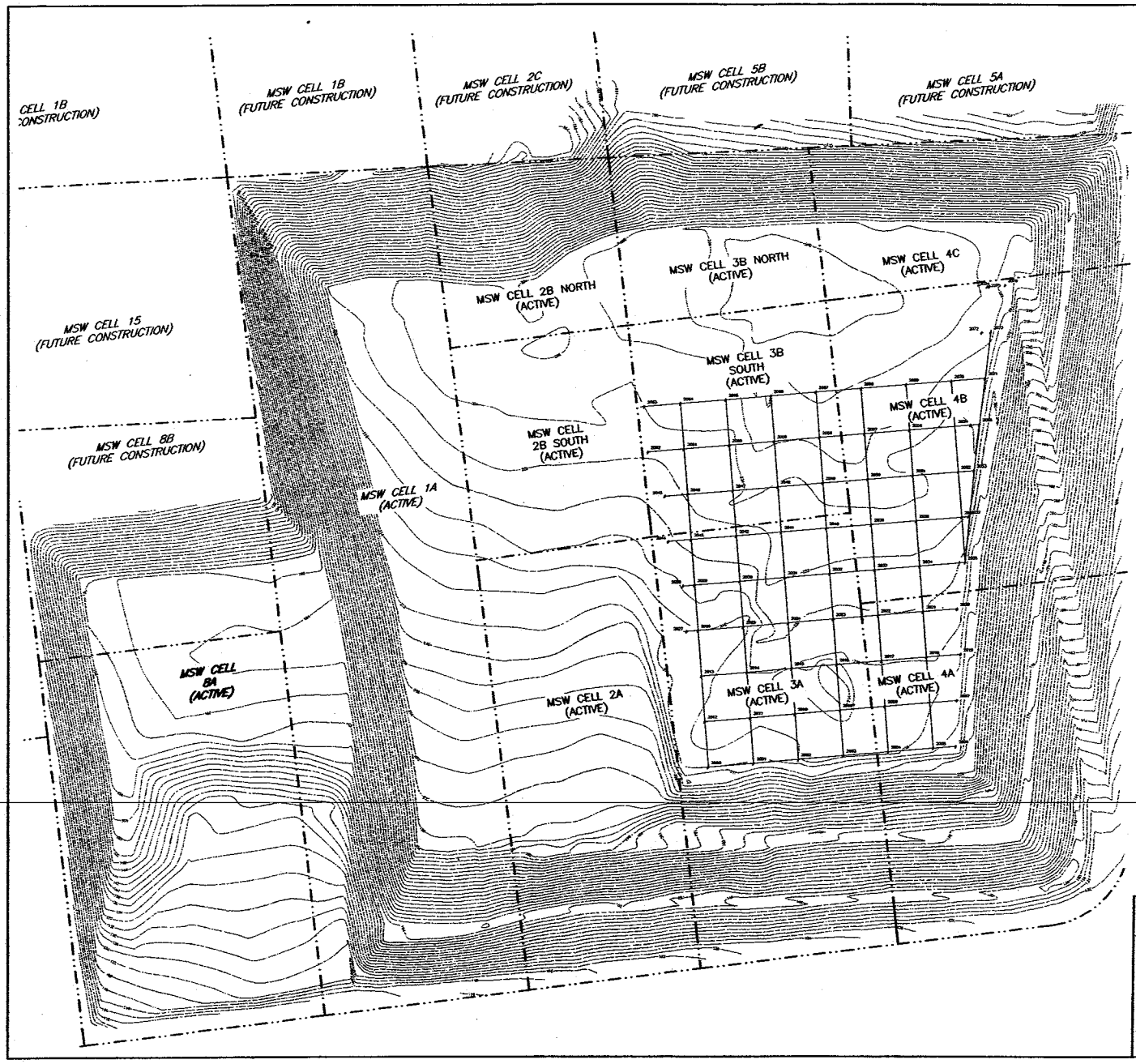
DATE

WASTE MANAGEMENT, INC.

FILE NO: 0284-001

DRAWING NO: 1 OF 2

P:\cadd\0284-king g\0284-001.dwg Thu May 08 10:06:14 2003 GeoSyntec Consultants, MD (DTM)



NOTES:

1. TOPOGRAPHIC INFORMATION IS FROM AN ELECTRONIC FILE BY FLORA SURVEYING OF A SURVEY CONDUCTED ON

100 50 0 100 200
SCALE IN FEET

GeoSyntec Consultants
COLUMBIA, MARYLAND (410)381-4333

REV.	DATE	DESCRIPTION	DR BY	APP BY

DATE:	NOVEMBER 2002		PROJECT NO.	ME0284
DES BY	DTM	NOV 02	PROJECT:	KING GEORGE COUNTY LANDFILL KING GEORGE COUNTY, VIRGINIA
DRN BY	JDC	NOV 02		
CHK BY	MFH	NOV 02	SHEET TITLE:	EXISTING CONDITIONS SITE PLAN
REV BY				
APP BY				

SCALE: 1" = 100'

SIGNATURE

DATE

WASTE MANAGEMENT, INC.

FILE NO: 0284-001

DRAWING NO: 1 OF 2

P:\cadd\0284-king g\0284f002.dwg Thu May 08 10:05:43 2003 GeoSyntec Consultants, MD (DTM)

APPENDIX A

LEACHATE QUALITY TEST RESULTS

(available upon request)

Leachate Parameters Detected - Cell 1
Project XL
King George County Landfill and Recycling Center
King George County, Virginia

Parameter	Units	MCL	27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02	27-Jan-03	24-Feb-03	24-Mar-03	16-Apr-03	14-Jul-03
1,4-Dichlorobenzene	ug/L	NA	-	7	6	10	7	-	14	9	-
2,4-Dimethylphenol	ug/L	NA	-	-	7	-	-	-	-	-	-
Acetone	ug/L	NA	400	99	180	2000	-	10000	640	-	-
Acetonitrile	ug/L	NA	-	86	-	180	-	-	-	-	-
Acetophenone	ug/L	NA	-	-	26	-	-	8	-	-	-
Benzene	ug/L	5	-	**16**	**14**	**16**	**11**	-	**18**	**13**	-
Calcium	ug/L	NA	195000	237000	254000	286000	180000	659000	232000	220000	178000
Diethyl Phthalate	ug/L	NA	-	4	46	46	-	55	-	44	-
Ethylbenzene	ug/L	700	23	38	22	42	30	61	78	42	-
Magnesium	ug/L	NA	142000	99300	149000	134000	186000	908000	118000	150000	175000
m,p-Cresol	ug/L	NA	-	-	2100	-	-	2200	1000	-	-
Methyl Ethyl Ketone	ug/L	NA	600	180	450	3000	67	14000	1100	-	-
Methyl Isobutyl Ketone	ug/L	NA	-	-	52	61	-	-	52	-	-
Methylene Chloride	ug/L	NA	24	4	-	8	-	-	-	-	-
Naphthalene	ug/L	NA	3	3	4	-	-	280	-	-	-
Nickel	ug/L	NA	58	35	41	40	68	24	34	44	69
o-Cresol	ug/L	NA	-	14	-	4000	-	-	-	-	-
Phenol	ug/L	NA	-	4	8	68	-	460	-	-	-
Sodium	ug/L	NA	761000	444000	770000	679000	956000	368000	533000	776000	1060000
Toluene	ug/L	1000	54	46	91	420	17	750	730	41	-
Total Xylene	ug/L	10000	68	100	130	110	79	150	190	120	89
Vanadium	ug/L	NA	31	19	39	31	48	16	30	37	45
Vinyl Chloride	ug/L	2	-	**3**	**2**	-	-	-	-	-	-
Zinc	ug/L	NA	20	48	32	61	260	150	100	71	61

Notes:
This table summarizes the leachate parameters that were detected in Cell 1. Samples where the concentration may be greater than the MCL are show in in **bold**.
In some cases, the method detection limit is higher than the MCL.

Leachate Parameters Detected - Cell 2
Project XL
King George County Landfill and Recycling Center
King George County, Virginia

Parameter	Units	MCL	27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02	27-Jan-03	24-Feb-03	24-Mar-03	16-Apr-03	14-Jul-03
1,1-Dichloroethane	ug/L	NA	-	10	7	-	-	-	-	-	-
1,4-Dichlorobenzene	ug/L	NA	11	13	12	-	14	-	16	13	-
2,4-Dimethylphenol	ug/L	NA	-	7	7	11	-	-	-	-	-
Acetone	ug/L	NA	1900	700	530	1100	950	5500	1000	150	-
Acetonitrile	ug/L	NA	-	340	-	200	-	-	-	-	-
Acetophenone	ug/L	NA	-	-	10	10	-	-	-	-	-
Antimony	ug/L	NA	12	-	-	-	-	-	-	-	-
Benzene	ug/L	5	**18**	**9**	**16**	**9**	**15**	-	-	-	-
Calcium	ug/L	NA	73300	107000	159000	130000	165000	291000	199000	150000	98600
Cyanide	ug/L	NA	-	12	14	-	-	-	-	61	-
Diethyl Phthalate	ug/L	NA	45	81	61	66	-	-	-	-	55
Ethylbenzene	ug/L	700	54	46	68	70	70	52	79	54	40
Magnesium	ug/L	NA	364000	267000	227000	186000	286000	135000	162000	167000	269000
m,p-Cresol	ug/L	NA	200	2000	1200	1700	980	1700	930	21	-
Methyl Ethyl Ketone	ug/L	NA	4400	3600	-	2200	2100	8200	1600	250	-
Methyl Isobutyl Ketone	ug/L	NA	92	78	65	56	-	78	32	-	-
Methylene Chloride	ug/L	NA	42	-	-	-	-	-	-	-	-
Naphthalene	ug/L	NA	3	-	-	6	-	-	-	-	-
Nickel	ug/L	NA	390	260	190	180	280	100	140	140	290
Phenol	ug/L	NA	3	25	25	22	-	220	-	-	-
Sodium	ug/L	NA	2000000	1400000	1270000	1080000	1700000	732000	895000	1000000	1640000
Toluene	ug/L	1000	220	320	330	280	100	260	340	25	-
Total Xylene	ug/L	10000	130	120	190	190	190	160	200	160	150
Vanadium	ug/L	NA	81	59	47	41	72	30	38	35	74
Zinc	ug/L	NA	250	18	160	140	140	98	94	89	170

Notes:
This table summarizes the leachate parameters that were detected in Cell 2. Samples where the concentration may be greater than the MCL are show in in **bold**.
In some cases, the method detection limit is higher than the MCL.

Leachate Parameters Detected - Cell 3
Project XL
King George County Landfill and Recycling Center
King George County, Virginia

Parameter	Units	MCL	27-Sep-02	28-Oct-02	########	19-Dec-02	27-Jan-03	24-Feb-03	########	16-Apr-03	14-Jul-03	14-Oct-03
1,1-Dichloroethane	ug/L	NA	20	23	-	**22**	-	-	-	-	-	-
1,4-Dichlorobenzene	ug/L	NA	12	-	-	12	17	-	16	19	22	21
Acetone	ug/L	NA	-	2000	-	5400	210	4100	2900	-	-	-
Acetonitrile	ug/L	NA	400	-	-	-	-	-	-	-	-	-
Acetophenone	ug/L	NA	-	-	-	8	-	-	-	-	-	-
Benzene	ug/L	5	-	**18**	-	**15**	-	-	-	-	-	-
Calcium	ug/L	NA	52600	67300	168000	211000	112000	297000	440000	175000	81000	76000
cis-1,2-Dichloroethene	ug/L	70	-	20	-	16	-	-	-	-	-	-
Cyanide	ug/L	NA	12	-	-	-	-	-	-	-	16	-
Diethyl Phthalate	ug/L	NA	-	-	6	38	-	-	-	-	-	-
Dichlorofluoromethane	ug/L	NA	-	-	-	6	-	-	-	-	-	-
Ethylbenzene	ug/L	700	47	40	7	64	44	50	75	61	53	54
Magnesium	ug/L	NA	270000	18100	99300	101000	213000	88100	100000	133000	224000	228000
m,p-Cresol	ug/L	NA	-	-	25	990	180	26	960	44	-	12
Methyl Ethyl Ketone	ug/L	NA	-	5200	110	12000	280	6500	8000	-	-	-
Methyl Isobutyl Ketone	ug/L	NA	-	73	-	110	-	-	-	-	-	-
Methylene Chloride	ug/L	NA	-	470	-	58	-	75	61	-	-	-
Naphthalene	ug/L	NA	-	-	-	3	-	-	-	-	-	18
Nickel	ug/L	NA	380	21	72	94	260	-	62	130	280	300
o-Cresol	ug/L	NA	-	86	-	13	-	-	-	-	-	-
o-Toluidine	ug/L	NA	16	-	-	16	27	19	-	-	-	-
Phenol	ug/L	NA	-	14	-	260	-	-	-	-	-	-
Sodium	ug/L	NA	1990000	84800	578000	531000	1600000	540000	580000	934000	1670000	1700000
Styrene	ug/L	NA	-	14	-	-	-	-	-	-	-	-
Tetrachloroethene	ug/L	NA	-	11	-	9	-	-	-	-	-	-
Toluene	ug/L	1000	58	420	12	420	96	280	410	50	44	60
Total Xylene	ug/L	10000	120	110	21	170	120	140	180	180	180	200
Trichloroethene	ug/L	5	-	-	-	**8**	-	-	-	-	-	-
Vanadium	ug/L	NA	120	5.2	13	26	94	26	31	44	100	110
Vinyl Chloride	ug/L	2	-	**13**	-	**10**	-	-	-	-	-	-
Zinc	ug/L	NA	80	120	48	150	160	87	140	110	200	220

Notes:

Leachate Parameters Detected - Cell 4
Project XL
King George County Landfill and Recycling Center
King George County, Virginia

Parameter	Units	MCL	27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02	27-Jan-03	24-Feb-03	24-Mar-03	16-Apr-03	14-Jul-03
1,1-Dichloroethane	ug/L	NA	-	-	-	-	-	9	-	-	-
1,4-Dichlorobenzene	ug/L	NA	-	10	3	16	17	29	30	17	17
2,4-Dimethylphenol	ug/L	NA	-	3	-	-	-	-	-	-	-
Acetone	ug/L	NA	-	44	530	770	-	1200	380	230	640
Acetonitrile	ug/L	NA	-	100	-	-	-	-	-	-	-
Benzene	ug/L	5	-	**5**	4	**6**	-	**10**	**9**	-	-
Calcium	ug/L	NA	119000	154000	251000	214000	194000	220000	248000	221000	210000
Cyanide	ug/L	NA	25	16	-	-	-	-	-	-	-
Diethyl Phthalate	ug/L	NA	-	7	10	20	-	-	-	-	-
Ethylbenzene	ug/L	700	-	21	64	53	51	130	120	49	45
Magnesium	ug/L	NA	186000	134000	128000	102000	164000	64200	94100	112000	96500
m,p-Cresol	ug/L	NA	-	11	-	1000	-	290	330	300	2100
Methyl Ethyl Ketone	ug/L	NA	-	65	1100	2600	-	1100	590	420	1200
Methyl Isobutyl Ketone	ug/L	NA	-	-	18	31	-	22	-	-	30
Methylene Chloride	ug/L	NA	21	-	-	-	-	-	-	-	25
Naphthalene	ug/L	NA	-	6	9	9	-	-	-	-	-
Nickel	ug/L	NA	220	120	80	66	120	30	-	-	62
o-Cresol	ug/L	NA	-	-	970	-	-	-	-	-	-
o-Toluidine	ug/L	NA	16	13	-	-	11	-	-	-	-
Phenol	ug/L	NA	-	-	-	7	-	69	-	-	-
Sodium	ug/L	NA	1390000	791000	723000	-	1130000	353000	453000	753000	660000
Toluene	ug/L	1000	-	13	92	36	21	330	290	41	50
Total Xylene	ug/L	10000	14	110	180	150	140	340	300	150	140
Vanadium	ug/L	NA	78	38	20	18	34	8	13	20	21
Vinyl Chloride	ug/L	2	-	-	**2**	-	-	**9**	-	-	-
Zinc	ug/L	NA	280	98	140	110	140	89	150	250	190

Notes:
This table summarizes the leachate parameters that were detected in Cell 4. Samples where the concentration may be greater than the MCL are show in in **bold**.
In some cases, the method detection limit is higher than the MCL.

Leachate Parameters Detected - Leachate Tank
Project XL
King George County Landfill and Recycling Center
King George County, Virginia

Parameter	Units	MCL	27-Sep-02	28-Oct-02	25-Nov-02	19-Dec-02	27-Jan-03	24-Feb-03	24-Mar-03	16-Apr-03	14-Jul-03
1,1-Dichloroethane	ug/L	NA	44	-	57	10	-	-	-	-	-
1,4-Dichlorobenzene	ug/L	NA	-	-	-	10	-	-	-	-	-
2,4-Dimethylphenol	ug/L	NA	42	-	-	-	-	-	-	-	-
Acetone	ug/L	NA	15000	9100	9000	5400	15000	9000	22000	19000	5300
Acetonitrile	ug/L	NA	170	-	-	-	-	-	-	-	-
Acetophenone	ug/L	NA	-	11	-	8	28	-	-	-	-
Benzene	ug/L	5	-	-	**28**	-	-	-	-	-	-
Benzyl Alcohol	ug/L	NA	-	-	-	62	250	170	-	-	-
Calcium	ug/L	NA	98800	99900	164000	149000	575000	486000	559000	482000	245000
cis-1,2-Dichloroethene	ug/L	70	-	-	49	-	-	-	-	-	-
Cyanide	ug/L	NA	-	10	-	-	-	-	-	310	-
Diethyl Phthalate	ug/L	NA	41	32	5	32	82	-	-	-	-
Ethylbenzene	ug/L	700	-	-	73	38	26	36	30	-	-
Magnesium	ug/L	NA	81100	78100	23100	57000	115000	108000	111000	102000	119000
m,p-Cresol	ug/L	NA	580	310	680	80	2800	3200	3100	2200	7900
Methyl Ethyl Ketone	ug/L	NA	36000	12000	23000	8100	27000	19000	37000	40000	1200
Methyl Isobutyl Ketone	ug/L	NA	400	-	220	100	240	330	210	-	110
Methylene Chloride	ug/L	NA	870	-	58	150	48	40	52	-	49
Methyl methacrylate	ug/L	NA	68	-	-	-	-	-	-	-	-
Naphthalene	ug/L	NA	-	-	-	5	-	-	-	-	-
Nickel	ug/L	NA	76	69	9.8	54	76	75	65	58	67
o-Cresol	ug/L	NA	-	-	-	8	-	-	-	-	-
o-Toluidine	ug/L	NA	-	8	-	-	-	-	-	-	-
Phenol	ug/L	NA	450	130	55	330	1300	1400	920	640	700
Sodium	ug/L	NA	422000	456000	-	276000	622000	631000	570000	602000	700000
Toluene	ug/L	1000	550	96	670	200	130	180	230	400	83
Total Xylene	ug/L	10000	76	-	200	100	70	99	76	-	-
Vanadium	ug/L	NA	16	16	8.7	16	31	21	28	23	22
Vinyl Chloride	ug/L	2	-	-	**10**	-	-	-	-	-	-
Zinc	ug/L	NA	110	54	120	670	250	330	310	130	70

APPENDIX B

DAILY LIQUID APPLICATION LOG

(available upon request)

Daily Liquid Application Log
King George Landfill
Monthly Summary

Date	Net Wt	Gallons
07/01/03	0.0	0.0
07/02/03	0.0	0.0
07/03/03	0.0	0.0
07/04/03	0.0	0.0
07/05/03	0.0	0.0
07/06/03	0.0	0.0
07/07/03	0.0	0.0
07/08/03	0.0	0.0
07/09/03	0.0	0.0
07/10/03	0.0	0.0
07/11/03	0.0	0.0
07/12/03	0.0	0.0
07/13/03	0.0	0.0
07/14/03	0.0	0.0
07/15/03	0.0	0.0
07/16/03	0.0	0.0
07/17/03	0.0	0.0
07/18/03	0.0	0.0
07/19/03	0.0	0.0
07/20/03	0.0	0.0
07/21/03	0.0	0.0
07/22/03	0.0	0.0
07/23/03	0.0	0.0
07/24/03	0.0	0.0
07/25/03	0.0	0.0
07/26/03	0.0	0.0
07/27/03	0.0	0.0
07/28/03	0.0	0.0
07/29/03	0.0	0.0
07/30/03	0.0	0.0
07/31/03	0.0	0.0
Totals	**0.0**	**0.0**

Daily Liquid Application Log
King George Landfill
Monthly Summary

Date	Net Wt	Gallons
08/01/03	0.0	0.0
08/02/03	0.0	0.0
08/03/03	0.0	0.0
08/04/03	0.0	0.0
08/05/03	0.0	0.0
08/06/03	0.0	0.0
08/07/03	0.0	0.0
08/08/03	0.0	0.0
08/09/03	0.0	0.0
08/10/03	0.0	0.0
08/11/03	0.0	0.0
08/12/03	0.0	0.0
08/13/03	0.0	0.0
08/14/03	0.0	0.0
08/15/03	0.0	0.0
08/16/03	0.0	0.0
08/17/03	0.0	0.0
08/18/03	0.0	0.0
08/19/03	0.0	0.0
08/20/03	0.0	0.0
08/21/03	0.0	0.0
08/22/03	0.0	0.0
08/23/03	0.0	0.0
08/24/03	0.0	0.0
08/25/03	0.0	0.0
08/26/03	0.0	0.0
08/27/03	0.0	0.0
08/28/03	0.0	0.0
08/29/03	0.0	0.0
08/30/03	0.0	0.0
08/31/03	0.0	0.0
Totals	**0.0**	**0.0**

Daily Liquid Application Log
King George Landfill
Monthly Summary

Date	Net Wt	Gallons
09/01/03	0.0	0.0
09/02/03	0.0	0.0
09/03/03	0.0	0.0
09/04/03	0.0	0.0
09/05/03	0.0	0.0
09/06/03	0.0	0.0
09/07/03	0.0	0.0
09/08/03	0.0	0.0
09/09/03	0.0	0.0
09/10/03	0.0	0.0
09/11/03	0.0	0.0
09/12/03	0.0	0.0
09/13/03	0.0	0.0
09/14/03	0.0	0.0
09/15/03	0.0	0.0
09/16/03	0.0	0.0
09/17/03	0.0	0.0
09/18/03	0.0	0.0
09/19/03	264,320.0	31,693.0
09/20/03	210,180.0	25,201.4
09/21/03	114,020.0	13,671.5
09/22/03	14,960.0	1,793.8
09/23/03	125,620.0	15,062.4
09/24/03	0.0	0.0
09/25/03	0.0	0.0
09/26/03	0.0	0.0
09/27/03	0.0	0.0
09/28/03	0.0	0.0
09/29/03	0.0	0.0
09/30/03	0.0	0.0
10/01/03	0.0	0.0
Totals	**729,100.0**	**87,422.1**

Daily Liquid Application Log
King George Landfill
Monthly Summary

Date	Net Wt	Gallons
10/01/03	0.0	0.0
10/02/03	0.0	0.0
10/03/03	0.0	0.0
10/04/03	0.0	0.0
10/05/03	0.0	0.0
10/06/03	0.0	0.0
10/07/03	0.0	0.0
10/08/03	0.0	0.0
10/09/03	0.0	0.0
10/10/03	0.0	0.0
10/11/03	0.0	0.0
10/12/03	0.0	0.0
10/13/03	0.0	0.0
10/14/03	0.0	0.0
10/15/03	0.0	0.0
10/16/03	0.0	0.0
10/17/03	54,340.0	6,515.6
10/18/03	0.0	0.0
10/19/03	0.0	0.0
10/20/03	0.0	0.0
10/21/03	0.0	0.0
10/22/03	0.0	0.0
10/23/03	0.0	0.0
10/24/03	0.0	0.0
10/25/03	0.0	0.0
10/26/03	0.0	0.0
10/27/03	0.0	0.0
10/28/03	0.0	0.0
10/29/03	0.0	0.0
10/30/03	0.0	0.0
10/31/03	0.0	0.0
Totals	**54,340.0**	**6,515.6**

Daily Liquid Application Log
King George Landfill
Monthly Summary

Date	Net Wt	Gallons
11/01/03	0.0	0.0
11/02/03	0.0	0.0
11/03/03	0.0	0.0
11/04/03	0.0	0.0
11/05/03	0.0	0.0
11/06/03	0.0	0.0
11/07/03	0.0	0.0
11/08/03	0.0	0.0
11/09/03	0.0	0.0
11/10/03	0.0	0.0
11/11/03	0.0	0.0
11/12/03	0.0	0.0
11/13/03	0.0	0.0
11/14/03	0.0	0.0
11/15/03	0.0	0.0
11/16/03	0.0	0.0
11/17/03	0.0	0.0
11/18/03	0.0	0.0
11/19/03	0.0	0.0
11/20/03	0.0	0.0
11/21/03	0.0	0.0
11/22/03	0.0	0.0
11/23/03	0.0	0.0
11/24/03	0.0	0.0
11/25/03	0.0	0.0
11/26/03	0.0	0.0
11/27/03	0.0	0.0
11/28/03	0.0	0.0
11/29/03	0.0	0.0
11/30/03	0.0	0.0
12/01/03	0.0	0.0
Totals	**0.0**	**0.0**

APPENDIX C

SETTLEMENT

(available upon request)

APPENDIX D

LANDFILL GAS DATA

(summary data included,
complete data available upon request)

ENGINEERING, INC.

Waste Industry Experts

Joyce Engineering, Inc
4808 Radford Ave
Richmond, VA 23230

tel: **804/355-4520**
fax: **804/355-4282**

www.JoyceEngineering.com

August 20, 2003

Mr. Douglas Mandeville
Senior Staff Engineer
Geosyntec Consultants, Inc.
10015 Old Columbia Road
Suite A-200
Columbia, Maryland 21046

Re: New King George County Landfill Permit - No. 586
XL Project Sampling Results - July 2003
JEI Project No. 464.01/Task No. 02/File Nos. 4.2 and 6.2

Dear Mr. Mandeville:

Please find attached the July 2003 results for leachate and landfill gas sampling and monitoring conducted at the New King George County Landfill for the XL Program. A brief summary of each activity is presented below.

Leachate Sampling

On July 14, 2003, Joyce Engineering, Inc. (JEI) personnel collected leachate samples for the XL Program. Five leachate samples were collected from leachate collection sumps, and one sample was collected from the leachate holding tank during the July 2003 leachate sampling event. In addition, a field blank was collected, and a laboratory-supplied trip blank accompanied the samples. After collection, the samples were placed in a cooler on ice and shipped to Severn Trent Laboratories (STL) of Amherst, New York, and Microbial Insights (MI) of Rockford, Tennessee, for analysis of biochemical oxygen demand (BOD), sulfate, chemical oxygen demand (COD), chloride, total organic carbon (TOC), potassium, volatile organic compounds, volatile organic acids, semi-volatile organic compounds, RCRA hazardous metals, ammonia-nitrogen, phosphorus, total Kjeldahl nitrogen (TKN), total dissolved solids (TDS), nitrate, nitrite, sulfide, cyanide, total phosphate, ortho-phosphate, sodium, magnesium, calcium, and bicarbonate/carbonate. In addition, field measurements of pH, specific conductance, and temperature were collected at the time of sampling.

Field sampling forms, chain-of-custody form, and laboratory certificates-of-analysis for the July 2003 leachate sampling event are presented in Attachment 1.

Landfill Gas Extraction Well Monitoring

On July 15, 2003, JEI personnel collected landfill gas (LFG) measurements of methane, carbon dioxide, oxygen, balance gases, and hydrogen sulfide from 48 LFG extraction wells. In

addition, measurements of temperature, flow rate, static vacuum, and differential pressure were recorded at the LFG extractions wells with CES-LandTEC wellheads. Measurements were recorded using a CES-LandTEC GEM 500 instrument, which was calibrated with a known calibration standard before and after use during the event. Hydrogen sulfide measurements were taken with an Industrial Scientific HS267 instrument which was calibrated with a known calibration standard prior to use during the event. A table displaying the LFG monitoring results is presented in Attachment 2.

Landfill Gas Sampling

On July 14, 2003, JEI personnel collected samples from the LFG collection system. Four 1-liter summa canister samples were collected from the western, central, and eastern header pipe of the LFG collection system, and from a location downstream of the LFG collection system blower. The samples were sent to STL of Los Angeles, California, for analysis of volatile organic compounds by EPA Method TO-15, and methane, oxygen, carbon dioxide, nitrogen, and non-methanogenic organic compounds (NMOCs) by ASTM methods. The chain-of-custody form and laboratory certificates-of-analyses for the July 2003 LFG samples are presented in Attachment 3.

Please feel free to contact me at 804-355-4520 or at mwilliams@joyceengineering.com if you have any questions concerning the XL Program results presented herein.

Sincerely,
JOYCE ENGINEERING, INC.

Michael G. Williams, C.P.G.
Senior Project Hydrogeologist

Attachments:
Attachment 1 - Leachate Field Sampling Forms, Chain-of-Custody Forms, and Laboratory Certificates-of-Analysis: July 2003
Attachment 2 - Landfill Gas Extraction Well Monitoring Data
Attachment 3 - Landfill Gas Field Sampling Forms, Chain-of-Custody Form, and Laboratory Certificates-of-Analyses: July 2003

C: James Stenborg, P.E., WMI
Howard Burns, WMI
David McMillan, JEI (letter only)

SEVERN TRENT STL

July 21, 2003

STL LOT NUMBER: **E3G150313**
PO/CONTRACT: 25894

Amy Haag
STL Buffalo
10 Hazelwood Drive
Amherst, NY 14228

Dear Ms. Haag,

This report contains the analytical results for the four samples received under chain of custody by STL Los Angeles on July 15, 2003. These samples are associated with your King George County Landfill project.

STL Los Angeles certifies that the test results provided in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in the case narrative. The case narrative is an integral part of the report. NELAP Certification Number for STL Los Angeles is E87652.

Any matrix related anomaly is footnoted within the report. Historical control limits for the LCS are used to define the estimate of uncertainty for a method. All applicable quality control procedures met method-specified acceptance criteria.

Preliminary results were sent via facsimile on Friday, July 18, 2003.

This report shall not be reproduced except in full, without the written approval of the laboratory.

This report contains **000044** pages.

If you have any questions, please feel free to call me at (714) 258-8610.

Sincerely,

Marisol Tabirara

Marisol Tabirara
Project Manager

cc: Project File

1

SEVERN TRENT STL

CANISTER FIELD DATA RECORD

CLIENT: Joyce Engineering
CANISTER SERIAL #: 93223
DATE CLEANED: 6-23-03B
CLIENT SAMPLE #: East Header
SITE LOCATION: Ingleside, VA

VFR ID: IT-56
Duration of comp.: ____ hrs. / mins.
Flow setting: 500 ml/min
Initials: SL

READING	TIME	Vac. (inches Hg) Or PRESS. (psig)	DATE	INITIALS
INITIAL VACUUM CHECK	[redacted]	30"-30"Hg	7-7-03 / 7/8/03	SL / KB
INITIAL FIELD VACUUM	1030 (20"Hg)	-20" Hg	7/14/03	KB
FINAL FIELD READING	1057	- 8" Hg	7/14/03	KB

LABORATORY CANISTER PRESSURIZATION			
INITIAL VACUUM (inches Hg or PSIA)	12.46	7-16-03	m
FINAL PRESSURE (PSIA)	24.16	7-16-03	m

Pressurization Gas: N_2

COMMENTS: Summa Canister seemed to be leaking. Was initially received when it was received at -30" Hg & ~~was~~ needle read -20" Hg before sampling. Pressure gauge read -5" Hg when not connected to canister. Initial field vacuum read beyond -30" Hg (off the gauge).

COMPOSITE TIME (HOURS)	FLOW RATE RANGE (ml/min)
15 Min.	316 – 333
30 Min.	158 – 166.7
1	79.2 – 83.3
2	39.6 – 41.7
4	19.8 – 20.8
6	13.2 – 13.9
8	9.9 – 10.4
10	7.92 – 8.3
12	6.6 – 6.9
24	3.5 – 4.0

N:\CORDOCS\CANISTER FIELD DATA RECORD(012103).doc

1.939

E3G150313

α

SEVERN TRENT STL

CANISTER FIELD DATA RECORD

CLIENT: Joyce Engineering
CANISTER SERIAL #: 12611
DATE CLEANED: 6-23-03B
CLIENT SAMPLE #: West Header
SITE LOCATION: Longview, WA

VFR ID: QAR-006
Duration of comp. : ____ hrs. / mins.
Flow setting: 500 ml/min
Initials: SL

READING	TIME	Vac. (inches Hg) Or PRESS. (psig)	DATE	INITIALS
INITIAL VACUUM CHECK	[redacted]	30" / -30" Hg	7-7-03 7-10-03	SL/KB
INITIAL FIELD VACUUM	1012:00	30" Hg	7-14-03	KB
FINAL FIELD READING	1023:30	<7" Hg	7-14-03	KB

LABORATORY CANISTER PRESSURIZATION			
INITIAL VACUUM (inches Hg or PSIA)	12.63	7-16-03	m
FINAL PRESSURE (PSIA)	23.96	7-16-03	m

Pressurization Gas: N_2

COMMENTS: Pressure gauge reads -5" Hg when not connected to canister. Initial field vacuum reads beyond -30" Hg (off the gauge).

COMPOSITE TIME (HOURS)	FLOW RATE RANGE (ml/min)
15 Min.	316 – 333
30 Min.	158 – 166.7
1	79.2 – 83.3
2	39.6 – 41.7
4	19.8 – 20.8
6	13.2 – 13.9
8	9.9 – 10.4
10	7.92 – 8.3
12	6.6 – 6.9
24	3.5 – 4.0

N:\COI\DOCS\CANISTER FIELD DATA RECORD(012103).doc

1.897

SEVERN TRENT STL

CANISTER FIELD DATA RECORD

CLIENT: Joyce Engineering
CANISTER SERIAL #: A-271
DATE CLEANED: 6-23-03B
CLIENT SAMPLE #: Control Header
SITE LOCATION: Kingsgeorge, VA

VFR ID: IT-22
Duration of comp. : ____ hrs. / mins.
Flow setting: 500 ml/min
Initials: SL

READING	TIME	Vac. (inches Hg) Or PRESS. (psig)	DATE	INITIALS
INITIAL VACUUM CHECK	[redacted]	30" -30"Hg	7-7-03 7-10-03	SL/KB
INITIAL FIELD VACUUM	1051	-30"Hg	7/14/03	KB
FINAL FIELD READING	1103	-8"Hg	7/14/03	KB

LABORATORY CANISTER PRESSURIZATION			
INITIAL VACUUM (inches Hg or PSIA)	12.24	7-16-3	a
FINAL PRESSURE (PSIA)	24.06	7-16-3	a

Pressurization Gas: N_2

COMMENTS: Pressure guage reads -5"Hg when not connected to canister. Initial Field vacuum read beyond -30"Hg (off the guage)

COMPOSITE TIME (HOURS)	FLOW RATE RANGE (ml/min)
15 Min.	316 – 333
30 Min.	158 – 166.7
1	79.2 – 83.3
2	39.6 – 41.7
4	19.8 – 20.8
6	13.2 – 13.9
8	9.9 – 10.4
10	7.92 – 8.3
12	6.6 – 6.9
24	3.5 – 4.0

N:\CONDOCS\CANISTER FIELD DATA RECORD(012103).doc

1-966

4

SEVERN TRENT STL

CANISTER FIELD DATA RECORD

CLIENT: Joyce Engineering
CANISTER SERIAL #: A-292
DATE CLEANED: 6-23-03B
CLIENT SAMPLE #: Post Blower
SITE LOCATION: Dry George, VA

VFR ID: LT-02
Duration of comp. : ___ hrs. / mins.
Flow setting: 500 ml/min
Initials: SL

READING	TIME	Vac. (inches Hg) Or PRESS. (psig)	DATE	INITIALS
INITIAL VACUUM CHECK	[redacted]	30"/-30" Hg	7-7-03 / 7/6/03	SL / KB
INITIAL FIELD VACUUM	0950	-30" Hg	7/14/03	KB
FINAL FIELD READING	1001	-6" Hg	7/14/03	KB

LABORATORY CANISTER PRESSURIZATION			
INITIAL VACUUM (inches Hg or PSIA)	12.63	7-16-3	m
FINAL PRESSURE (PSIA)	24.15	7-16-3	m

Pressurization Gas: N_2

COMMENTS: Pressure gauge was reading -5" Hg as it's zero when not connected to anything. Initial field vacuum read beyond -30" Hg (off the gauge).

COMPOSITE TIME (HOURS)	FLOW RATE RANGE (ml/min)
15 Min.	316 – 333
30 Min.	158 – 166.7
1	79.2 – 83.3
2	39.6 – 41.7
4	19.8 – 20.8
6	13.2 – 13.9
8	9.9 – 10.4
10	7.92 – 8.3
12	6.6 – 6.9
24	3.5 – 4.0

N:\CORDOCS\CANISTER FIELD DATA RECORD(012103).doc

L906

ENGINEERING, INC.

Waste Industry Experts

Joyce Engineering, Inc
4808 Radford Ave
Richmond, VA 23230

tel: **804/355-4520**
fax: **804/355-4282**

www.JoyceEngineering.com

December 8, 2003

Mr. Douglas Mandeville
Senior Staff Engineer
Geosyntec Consultants, Inc.
10015 Old Columbia Road
Suite A-200
Columbia, Maryland 21046

Re: New King George County Landfill Permit - No. 586
XL Project Sampling Results – October 2003
JEI Project No. 464.01/Task No. 02/File Nos. 4.2 and 6.2

Dear Mr. Mandeville:

Please find attached the October 2003 results for leachate and landfill gas sampling and monitoring conducted at the New King George County Landfill for the XL Program. A brief summary of each activity is presented below.

Leachate Sampling

On October 14, 2003, Joyce Engineering, Inc. (JEI) personnel collected leachate samples for the XL Program. Five leachate samples were collected from leachate collection sumps, and one sample was collected from the leachate holding tank during the October 2003 leachate sampling event. In addition, a field blank was collected, and a laboratory-supplied trip blank accompanied the samples. After collection, the samples were placed in a cooler on ice and shipped to Severn Trent Laboratories (STL) of Amherst, New York, and Microbial Insights (MI) of Rockford, Tennessee, for analysis of biochemical oxygen demand (BOD), sulfate, chemical oxygen demand (COD), chloride, total organic carbon (TOC), potassium, volatile organic compounds, volatile organic acids, semi-volatile organic compounds, RCRA hazardous metals, ammonia-nitrogen, phosphorus, total Kjeldahl nitrogen (TKN), total dissolved solids (TDS), nitrate, nitrite, sulfide, cyanide, total phosphate, ortho-phosphate, sodium, magnesium, calcium, and bicarbonate/carbonate. In addition, field measurements of pH, specific conductance, temperature, and turbidity were collected at the time of sampling.

Field sampling forms, chain-of-custody form, and laboratory certificates-of-analysis for the October 2003 leachate sampling event are presented in Attachment 1.

Landfill Gas Extraction Well Monitoring

On October 15, 2003, JEI personnel collected landfill gas (LFG) measurements of methane, carbon dioxide, oxygen, balance gases, and hydrogen sulfide from 48 LFG extraction wells. In

addition, measurements of temperature, flow rate, static vacuum, and differential pressure were recorded at the LFG extractions wells with CES-LandTEC wellheads. Measurements were recorded using a CES-LandTEC GEM 500 instrument, which was calibrated with a known calibration standard before and after use during the event. Hydrogen sulfide measurements were taken with an Industrial Scientific HS267 instrument which was calibrated with a known calibration standard prior to use during the event. A table displaying the LFG monitoring results is presented in Attachment 2.

Landfill Gas Sampling

On October 14, 2003, JEI personnel collected samples from the LFG collection system. Four 1-liter summa canister samples were collected from the western, central, and eastern header pipe of the LFG collection system, and from a location downstream of the LFG collection system blower. The samples were sent to STL of Los Angeles, California, for analysis of volatile organic compounds by EPA Method TO-15, and methane, oxygen, carbon dioxide, nitrogen, and non-methanogenic organic compounds (NMOCs) by ASTM methods. The chain-of-custody form and laboratory certificates-of-analyses for the October 2003 LFG samples are presented in Attachment 3.

Please feel free to contact me at 804-355-4520 or at mwilliams@joyceengineering.com if you have any questions concerning the XL Program results presented herein.

Sincerely,
JOYCE ENGINEERING, INC.

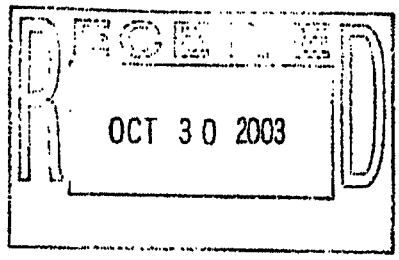
Michael G. Williams, C.P.G.
Senior Project Hydrogeologist

Attachments:
Attachment 1 - Leachate Field Sampling Forms, Chain-of-Custody Forms, and Laboratory Certificates-of-Analysis: October 2003
Attachment 2 - Landfill Gas Extraction Well Monitoring Data
Attachment 3 - Landfill Gas Field Sampling Forms, Chain-of-Custody Form, and Laboratory Certificates-of-Analyses: October 2003

C: James Stenborg, P.E., WMI
Howard Burns, WMI
David McMillan, JEI (letter only)

ENGINEERING, INC.

SEVERN TRENT STL



October 26, 2003

STL LOT NUMBER: **E3J160421**
PO/CONTRACT: 25894

Amy Haag
STL Buffalo
10 Hazelwood Drive
Amherst, NY 14228

Dear Ms. Haag,

This report contains the analytical results for the four samples received under chain of custody by STL Los Angeles on October 15, 2003. These samples are associated with your King George County Landfill project.

STL Los Angeles certifies that the test results provided in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in the case narrative. The case narrative is an integral part of the report. NELAP Certification Number for STL Los Angeles is E87652.

Any matrix related anomaly is footnoted within the report. Historical control limits for the LCS are used to define the estimate of uncertainty for a method. All applicable quality control procedures met method-specified acceptance criteria.

Preliminary results were sent via facsimile on Friday, October 24, 2003.

This report shall not be reproduced except in full, without the written approval of the laboratory.

This report contains 000044 pages.

If you have any questions, please feel free to call me at (714) 258-8610

Sincerely,

Marisol Tabirara

Marisol Tabirara
Project Manager

cc: Project File

SEVERN TRENT STL

CANISTER FIELD DATA RECORD

CLIENT: STL Buffalo
CANISTER SERIAL #: A-269
DATE CLEANED: 9-20-03B
CLIENT SAMPLE #: East Header
SITE LOCATION: Eggertsville, NY

VFR ID: LF-09
Duration of comp : ____ hrs. / mins
Flow setting: 500.0 ml/min
Initials: SL

READING	TIME	Vac. (inches Hg) Or PRESS. (psig)	DATE	INITIALS
INITIAL VACUUM CHECK	[redacted]	30"	10-3-03	SL
INITIAL FIELD VACUUM	1052:00	-3" Hg	10/14/03	KB
FINAL FIELD READING	1152:45	-3" Hg	10/14/03	KB

LABORATORY CANISTER PRESSURIZATION			
INITIAL VACUUM (PSIA)	13.09	10-16-03	MB
FINAL PRESSURE (PSIA)	24.05	10-16-03	MB

Pressurization Gas: N2

COMMENTS:

COMPOSITE TIME (HOURS)	FLOW RATE RANGE (ml/min)
15 Min.	316 – 333
30 Min.	158 – 166.7
1	79.2 – 83.3
2	39.6 – 41.7
4	19.8 – 20.8
6	13.2 – 13.9
8	9.9 – 10.4
10	7.92 – 8.3
12	6.6 – 6.9
24	3.5 – 4.0

N:\CORDOCS\CANISTER FIELD DATA RECORD(012103).doc

SEVERN TRENT STL

CANISTER FIELD DATA RECORD

CLIENT: STL Buffalo
CANISTER SERIAL #: 04314
DATE CLEANED: 9-20-03B
CLIENT SAMPLE #: Westhead
SITE LOCATION: Lasalle Rd. VA.

VFR ID: IT-40
Duration of comp : ____ hrs. / mins.
Flow setting: 500.0 ml/min
Initials: SL

READING	TIME	Vac. (Inches Hg) Or PRESS. (psig)	DATE	INITIALS
INITIAL VACUUM CHECK	[redacted]	30"	10-3-03	SL
INITIAL FIELD VACUUM	1100.00	-30" Hg	10/14/03	KB
FINAL FIELD READING	1118:30	-4" Hg	10/14/03	KB

LABORATORY CANISTER PRESSURIZATION			
INITIAL VACUUM (PSIA)	12.05	10-16-03	MN
FINAL PRESSURE (PSIA)	24.86	10-16-03	MN

Pressurization Gas: N2

COMMENTS:

COMPOSITE TIME (HOURS)	FLOW RATE RANGE (ml/min)
15 Min.	316 – 333
30 Min.	158 – 166.7
1	79.2 – 83.3
2	39.6 – 41.7
4	19.8 – 20.8
6	13.2 – 13.9
8	9.9 – 10.4
10	7.92 – 8.3
12	6.6 – 6.9
24	3.5 – 4.0

N:\CONDOCS\CANISTER FIELD DATA RECORD(012103).doc

SEVERN TRENT STL

CANISTER FIELD DATA RECORD

CLIENT: STL Buffalo
CANISTER SERIAL #: A-146
DATE CLEANED: 9-20-03 B
CLIENT SAMPLE #: Central Heat
SITE LOCATION: Bridgeport, VT

VFR ID: I T-04
Duration of comp : ____ hrs. / mins.
Flow setting: 500.0 ml/min
Initials: SL

READING	TIME	Vac. (Inches Hg) Or PRESS. (psig)	DATE	INITIALS
INITIAL VACUUM CHECK	[redacted]	30"	10-3-03	SL
INITIAL FIELD VACUUM	1128:00	-30" Hg	10/14/03	KB
FINAL FIELD READING	1136:30	-5" Hg	10/14/03	KB

LABORATORY CANISTER PRESSURIZATION			
INITIAL VACUUM (PSIA)	11.57	10-16-03	MG
FINAL PRESSURE (PSIA)	25.14	10-16-03	MG

Pressurization Gas: N2

COMMENTS:

COMPOSITE TIME (HOURS)	FLOW RATE RANGE (ml/min)
15 Min.	316 – 333
30 Min.	158 – 166.7
1	79.2 – 83.3
2	39.6 – 41.7
4	19.8 – 20.8
6	13.2 – 13.9
8	9.9 – 10.4
10	7.92 – 8.3
12	6.6 – 6.9
24	3.5 – 4.0

N:\COI\DOCS\CANISTER FIELD DATA RECORD(012103).doc

SEVERN TRENT STL

CANISTER FIELD DATA RECORD

CLIENT: STL Buffalo
CANISTER SERIAL #: 9413BB
DATE CLEANED: 9-20-03B
CLIENT SAMPLE #: PostBrewer
SITE LOCATION: Kingsbury, NY

VFR ID: HT-3C
Duration of comp : ____ hrs. / mins
Flow setting: 500.0 ml/min
Initials: SL

READING	TIME	Vac. (inches Hg) Or PRESS. (psig)	DATE	INITIALS
INITIAL VACUUM CHECK	[redacted]	30"	10-3-03	SL
INITIAL FIELD VACUUM	1028	-30" Hg	10/14/03	KB
FINAL FIELD READING	1037	0" Hg	10/14/03	KB

LABORATORY CANISTER PRESSURIZATION			
INITIAL VACUUM (PSIA)	14.38	10-16-03	NL
FINAL PRESSURE (PSIA)	24.07	10-16-03	NL

Pressurization Gas: N2

COMMENTS:

COMPOSITE TIME (HOURS)	FLOW RATE RANGE (ml/min)
15 Min.	316 – 333
30 Min.	158 – 166.7
1	79.2 – 83.3
2	39.6 – 41.7
4	19.8 – 20.8
6	13.2 – 13.9
8	9.9 – 10.4
10	7.92 – 8.3
12	6.6 – 6.9
24	3.5 – 4.0

N:\CO\DOCS\CANISTER FIELD DATA RECORD(012103).doc

APPENDIX E

GROUNDWATER QUALITY COMPLIANCE

ENGINEERING, INC.

Waste Industry Experts

Joyce Engineering, Inc
1604 Ownby Lane
Richmond, VA 23220

tel: **804/355-4520**
fax: **804/355-4282**

www.JoyceEngineering.com

January 14, 2004

Mr. James Stenborg, P.E.
c/o Waste Management, Inc.
10376 Bullock Drive
King George, Virginia 22485

Re: King George County Landfill, Permit No. 586
XL Project
JEI Project No. 464.21File No. 1.2

Dear Jim:

Per your request, Joyce Engineering, Inc. has compared the available groundwater monitoring data through January 2004 for the uppermost aquifer compliance monitoring network at the King George County Landfill, Permit No. 586, to the current Maximum Contaminant Levels (MCL) for the constituents that are listed in Table 1 of 40 CFR Part 258.40. I understand that this comparison is required pursuant to the Site Rule Making Requirements for the XL Project.

Based on my review, the following constituents in Table 1 of 40 CFR Part 258.40 have been detected at concentrations that exceed the current MCL; however, it is noted that the detected concentrations were less than the facility background concentrations at the time of detection. Subsequently, the concentrations did not represent statistically significant concentrations and the monitoring program at the King George County Landfill, Permit No. 586, was allowed to continue in the Detection Monitoring Program.

Constituent	Current MCL (ug/L)	Sample Location	Sample Date	Monitoring Result (ug/L)
Arsenic	10.0	TW02U	8/8/96	20
		TW06D	6/21/96	33
		TW11D	12/17/02	12
Cadmium	5.0	TW02U	3/18/99	16
			12/16/96	14
			3/19/97	12
			12/29/97	9.2
			1/17/97	8.5
			2/13/97	8.4
			9/5/97	7
			9/8/98	6.4

Constituent	Current MCL (ug/L)	Sample Location	Sample Date	Monitoring Result (ug/L)
		TW06D	6/21/96	8.9
Cadmium	5.0	TW13D	3/19/99	18
			12/17/98	9.5
			6/16/98	6.8
Lead	15.0	TW01U	3/10/03	31
			12/11/00	20
		TW02U	8/8/96	51
			6/21/96	20

Note that the wells designated with the postscript "U" are considered upgradient wells at this facility. If you have any questions, please contact me at 804-355-4520.

Sincerely
JOYCE ENGINEERING, INC.

Michael G. Williams, C.P.G.
Senior Project Hydrogeologist

Cc: Doug Mandeville, Staff Engineer, Geosyntec Consultants, Inc.,
10015 Old Columbia Road, Suite A-200, Columbia, Maryland 21046

P:\Waste Management\Virginia\King George County New - WMI\Environmental\Correspondence\Part 258.40 Review Letter January 14, 2004 update.doc

JOYCE ENGINEERING, INC.

APPENDIX F

FIELD NOTES AND BORING LOGS FROM NOVEMBER 2003 SOLID WASTE SAMPLING EVENT

M E M O R A N D U M

TO: Jim Stenborg
Waste Management, Inc.

FROM: Doug Mandeville
GeoSyntec Consultants
Columbia, Maryland

DATE: 19 January 2004

SUBJECT: Field Report for Site Work, 12 through 14 November 2003
Monitoring Services
King George County Landfill and Recycling Facility
King George, Virginia

Enclosed is a draft copy of my field report for the MSW sampling, and investigative work carried out at King George between 12 November and 14 November 2003. The contents of this draft report are as follows:

* * * * *

Field Work Report

CLIENT & SITES: **Waste Management, Inc.**
King George County Landfill Bioreactor Project

PROJECT NUMBER: **ME0284**

REPORT ON SITE ACTIVITIES: KING GEORGE (KG)
1. Install 3 no. boreholes a depth of 60 feet into MSW in leachate recirculation area.
2. Install 2 no. boreholes a depth of 60 feet into MSW in control area.
3. Collect background MSW samples from boreholes for laboratory analysis.

REPORTED BY & DATE(S): Doug Mandeville 12 November – 14 November 2003
PAGES:

PERSONNEL ON SITE: Doug Mandeville, GeoSyntec
Kellett's Well Boring

12 November 2003

08:30 On site.
Met up with drillers. Discussed plan for drilling sample holes and gas wells in recirculation trenches. Weather is overcast, with showers, temperatures in mid 60's.

09:15 Begin boring of C-1. C-1 is located in Cell 4B, closest landfill gas wells are GW-21 and GW-25. C-1 is approximately 80 ft southwest of GW-25 and approximately 150 ft northeast of GW-21. See attached figure for location.
Method: Excavate using bucket auger in approximately 15-ft sections. Place on landfill surface adjacent to BH. DM note condition/composition of MSW from each bucket auger load. Measure MSW temperature every few feet. Collect representative MSW sample (approx. 10 gallons) from each 15-ft section for lab analysis. Date MSW from newspapers (when available). MSW samples are sealed in plastic bags and then in heavy-duty plastic 5 gallon buckets for delivery to Virginia Tech labs via FedEx at the end of each day.

9:35 Completed sample C-1 3-10 ft.

9:55 Completed sample C-1 10-25 ft.

10:15 Completed sample C-1 25-40 ft.

11:00 Completed sample C-1 40-55 ft.

11:15 General comments on boring C-1: no apparent change in water content via visual classification of waste. Degree of sample degradation did appear to increase with depth. Boring backfilled with waste.

13:30	Begin boring of C-2. C-2 is located in Cell 4-B, closest landfill gas well is GW-17. C-2 is approximately 100 ft east of GW-17. See attached figure for location. Method: same as for C-1.
14:00	Completed sample C-2 3-15 ft.
14:30	Completed sample C-2 15-30 ft.
14:50	Completed sample C-2 30-45 ft.
15:15	Completed sample C-2 45-60 ft.
15:30	General comments on boring C-2: no apparent change in water content via visual classification of waste. Degree of sample degradation did appear to increase with depth. Waste appears to be similar to what was observed in boring C-1. Boring backfilled with waste.
16:00	Met briefly with J. Stenborg to discuss plan for drilling in test area. Will try to drill to top of the recirculation trenches and install landfill gas collection wells (5 ft of perforated pipe backfilled with gravel, then 20 ft of solid pipe backfilled with soil and 2 bentonite seals). Will drill test borings to depth of 60 ft and backfill with tire shreds.
17:00	Off site, to FedEx office in Fredericksburg to ship 8 sample containers to Virginia Tech for laboratory testing.

13 November 2003

07:00	On site. Weather is sunny, 50's, very windy – sustained winds over 30 mph, gusts over 40 mph.
07:40	Started drilling into recirculation trench (see attached figure, 3rd trench north from the slope facing the office and rail transfer station facility).
08:40	Hit layer of very wet waste at depth of 26 ft below ground surface. Bucket auger could not advance beyond this depth. Installed 6 ft of 8 in diameter perforated pipe, backfilled with gravel, then 20 ft of solid pipe, backfilled with soil. Filled to about 5 ft below ground surface to leave room for bentonite seals.
08:45-10:00	Bulldozer stuck in wet soil as delivering backfill material for gas well.
10:20	Begin boring of T-1. T-1 is located between the 2nd and 3rd trenches (counting from the slope facing the office and rail transfer station facility), approximately 50 ft south of the trench (it is approximately between two trenches, see attached figure for location). Method: same as for C-1.
11:00	Completed sample T-1 0-15 ft.
11:50	Completed sample T-1 15-30 ft.

11:50	Crack developed in Kelly (long cylinder that spins to drive the bucket auger), can't drill any further, stop drilling at T-1 (depth approximately 30 ft bgs) and covered hole with grate. Kellet's to fix cylinder and be ready to drill Fri. am.
13:00	Identified potential sites for next boring locations, obtained coordinates for existing locations.
15:30	Met with Howard Burns to review days activities and update with future plans.
16:00	Off site, to FedEx office in Fredericksburg to ship 2 sample containers to Virginia Tech for laboratory testing.

14 November 2003

07:10	On site. Weather is sunny, low 60's, light breeze (about 10 mph).
08:00	Begin boring of T-1 from where we left off yesterday
08:15	Completed sample T-1 30-45 ft.
08:45	Completed sample T-1 45-60 ft.
08:50	General comments on boring T-1: Degree of sample degradation did appear to increase with depth. Obvious change in water content of waste, especially at about 50 ft bgs. Did observe leachate on the outside of the bucket auger. Does appear to be some lateral distribution of leachate from the trenches as this boring location is approximately 50 ft from the nearest trench. Boring backfilled with tire shreds and waste.
09:00	Begin boring T-2. Boring is located approximately 25 ft north of the second trench counting from the top of the slope facing the office and rail transfer station facility (see attached figure for location).
09:15	Completed sample T-2 4-20 ft.
09:40	Completed sample T-2 20-37 ft.
10:00	Completed sample T-2 37-47 ft.
10:35	Completed sample T-2 47-59 ft.
10:40	General comments on boring T-2: Degree of sample degradation did appear to increase with depth. Obvious change in water content of waste, especially at about 37 to 40 ft bgs. Waste at this location was very wet; leachate was running down the side of the bucket auger. Leachate may have been entering the hole as the waste at the bottom of the bucket auger looked a little drier and the leachate was running down the side of the auger. Below this elevation, the waste did look to be a little drier than the waste at about depth 40. Does appear to be some lateral distribution of leachate from the trenches as this boring location is approximately 25 ft from the nearest trench. Does appear to be some vertical variation in the water content beneath a depth of 40 ft bgs. Boring backfilled with tire shreds and waste.

10:50	Begin boring T-3. Boring is located approximately 50 ft west of landfill gas well GW-12 and approximately 15 ft north of the first trench counting from the top of the slope facing the office and rail transfer station facility (see attached figure for location).
11:15	Completed sample T-3 4-17 ft.
11:35	Completed sample T-3 17-30 ft.
12:05	Completed sample T-3 30-40 ft.
12:10	General comments on boring T-3: Degree of sample degradation did appear to increase with depth. Obvious change in water content of waste, especially at about 35 ft bgs. Waste at this location was very wet; leachate was running down the side of the bucket auger. At an approximate depth of 36 ft, there was a soil layer that appeared to be inhibiting vertical leachate flow. Could not drill past this layer. A soil sample was obtained for classification later. Does appear to be some lateral distribution of leachate from the trenches as this boring location is approximately 15 ft from the nearest trench. Boring backfilled with tire shreds and waste.
12:15	Started drilling into trench 1 (counting from the top of the slope facing the office and rail transfer station facility (see attached figure for location).
13:00	Hit very wet layer of waste at a depth of about 30 ft bgs, could not drill through this layer. Bucket auger could not advance beyond this depth. Installed 6 ft of 8 in diameter perforated pipe, backfilled with gravel, then 20 ft of solid pipe, backfilled with soil. Filled to about 5 ft below ground surface to leave room for bentonite seals.
13:30	Problems with drill rig; worried about Kelly cracking again, stopped drilling for the day; Kellet's is having a replacement part shipped, should be here around 11/20/03.
14:00	Met briefly with Howard Burns to update him on today's progress.
14:30	Off site, to FedEx office in Fredericksburg to ship 10 sample containers to Virginia Tech for laboratory testing.

PHOTOGRAPHS TAKEN (numbered to correspond to summary page)

27. Waste from gas well drilled on 11/5/03.
26. Boring C-1.
25. Waste from approximate depth 10 ft bgs.
24. Waste from approximate depth 15 ft bgs.
23. Waste from approximate depth 25 to 30 ft bgs.
22. Waste from approximate depth 35 ft bgs.
21. Waste from approximate depth 50 ft bgs.
20. Waste from approximate depth 60 ft bgs.
19. Boring C-2.
18. Waste from approximate depth 23 ft bgs.
17. Waste from approximate depth 30 ft bgs.
16. Waste from approximate depth 40 ft bgs.

15. Waste immediately above trench 3 (depth approximately 26 ft bgs).
14. Waste from approximate depth 15 ft bgs.
13. Waste stuck in bucket, boring T-1.
12. Waste sample, boring T-2, depth approximately 20 ft bgs.
11. Waste sample, boring T-2, depth approximately 25 ft bgs.
10. Waste sample, boring T-2, depth approximately 30 ft bgs.
9. Waste sample, boring T-2, depth approximately 35 ft bgs.
8. Waste sample, boring T-2, depth approximately 35 ft bgs.
7. Waste sample, boring T-2, depth approximately 37 ft bgs.
6. Bucket with waste from approximate depth 40 ft bgs, boring T-2.
5. Tire chips used to backfill trenches.
4. Waste from approximate depth 30 ft bgs, boring T-3.
3. Soil/waste at boring T-3, depth approximately 35 to 40 ft bgs.

GeoSyntec Consultants
COLUMBIA, MARYLAND

CLIENT & SITE: Waste Management, Inc. King George Landfill – Bioreactor Project.
PROJECT NUMBER: ME0284
LOG, LOGGER & DATE: Borehole C-1: Control Area D. Mandeville 12 November 2003
LOCATION: Northing: Easting: Elev. ft.
METHOD: Rotary 36" dia. Bucket auger

Depth (ft.)	Description of Waste / Notes	Temperature (°F)
	Cover: <4-ft. brown silty sand, started boring at 09:15 am	
	4-ft. to 7-ft. General MSW, plastic bottles, some wood, chunk of concrete	100
	7-ft. to 10-ft. newspaper dated 30 March 2003, plastic bags, completed sample C-1 3-ft. to 10-ft. at 09:35 am	85
10		
	10-ft. to 15-ft. wood, general debris, some legible newspaper, no dates, plastic container, little to no food scraps	94
	16-ft. black waste, no legible paper	
20		
	20-ft. to 25-ft. gray waste, not as black as above, some some legible paper, no dates, little to no food scraps, completed sample C-1 10-ft. to 25-ft. at 09:55 am	90
	26-ft. same as above	
30		
	30-ft. some soil, plastic bags, envelopes, no obvious change in water content 31-ft. black waste, some legible paper, no dates 32-ft. some wood/lumber	
40	38-ft. mixed waste, plastic bags, wood, no identifiable food waste	100

GeoSyntec Consultants
COLUMBIA, MARYLAND

CLIENT & SITE: Waste Management, Inc. King George Landfill – Bioreactor Project.
PROJECT NUMBER: ME0284
LOG, LOGGER & DATE: Borehole C-1: Control Area D Mandeville 12 November 2003
LCOATION: Northing: Easting: Elev. ft.
METHOD: Rotary 36" dia. Bucket auger

Depth (ft.)	Description of Waste / Notes	Time	Temperature (°F)	pH	Mass (lb) Density (pcf)
	Completed sample C-1 25-ft. to 40-ft. 10:15 am				
	44-ft. mix of paper, wood, plastic		110		
50					
	50-ft. concrete chunk, computer printouts		110		
	55-ft. mixed waste				
60	ended boring at 60-ft. bgs at 11:15 am, completed sample C-1 40-ft. to 55-ft.				
70					
80					

GeoSyntec Consultants
COLUMBIA, MARYLAND

CLIENT & SITE: Waste Management, Inc. King George Landfill – Bioreactor Project.
PROJECT NUMBER: ME0284
LOG, LOGGER & DATE: Borehole C-2: Control Area D. Mandeville 12 November 2003
LOCATION: Northing: Easting: Elev. ft.
METHOD: Rotary 36" dia. Bucket auger

Depth (ft.)	Description of Waste / Notes	Temperature (°F)
	Cover: <3-ft. gray to brown clayey soil, Boring started at 13:30 pm	
	4-ft. mixed waste, black cloth, plastic, no legible paper, wood, difficult to drill through	80
10	9-ft. mixed waste, no newspaper with dates	
	15-ft. same as above, completed sample C-2 3-ft. to 15-ft. at 14:00 pm	84
20		
	20-ft. black waste, wood scraps, no obvious increase in water content	
	26-ft. mixed waste, identifiable orange peel and candy wrappers	
30	30-ft. some paper with legible writing, no dates	90
	completed sample C-2 15-ft. to 30-ft. at 14:30 pm	
	33-ft. some paper with legible writing, no dates, plastic decreasing particle size of waste	
40	38-ft. black waste with plastic, some paper, no identifiable food scraps	

GeoSyntec Consultants
COLUMBIA, MARYLAND

CLIENT & SITE: Waste Management, Inc. King George Landfill – Bioreactor Project.
PROJECT NUMBER: ME0284
LOG, LOGGER & DATE: Borehole C-2: Control Area D Mandeville 12 November 2003
LCOATION: Northing: Easting: Elev. ft.
METHOD: Rotary 36" dia. Bucket auger

Depth (ft.)	Description of Waste / Notes	Time	Temperature (°F)	pH	Mass (lb) Density (pcf)
	Completed sample C-2 30-ft. to 45-ft. at 14:50 pm				
50	50-ft. legible newspaper, no date, plastic bags, some wood		115		
	55-ft. pieces of carpet with waste, no apparent change in water content		120		
60	60-ft. layer of brown to black soil, few rocks				
	ended boring at 62-ft. bgs at 15:15 pm, completed sample C-2 45-ft. to 60-ft.				
70					
80					

GeoSyntec Consultants
COLUMBIA, MARYLAND

CLIENT & SITE: Waste Management, Inc. King George Landfill – Bioreactor Project.
PROJECT NUMBER: ME0284
LOG, LOGGER & DATE: Borehole T-1: Recirculation Area D. Mandeville 13/14 November 2003
LOCATION: Northing: Easting: Elev. ft.
METHOD: Rotary 36" dia. Bucket auger

Depth (ft.)	Description of Waste / Notes	Temperature (°F)
	Cover: <3-ft. cover soil, started boring at 10:20 am	
	5-ft. carpet scraps, mildly degraded waste, no food	75
10	10-ft. general MSW, little paper	
	12-ft. same as above	85
	completed sample T-1 0-ft. to 15-ft. at 11:00 am 16-ft. black waste, no legible paper	
20	18-ft. same as above, less plastic	
	24-ft. mixed waste, no visible food wastes	
30	28-ft. increasing moisture content 30-ft. black waste, little paper, increased degradation	110
	completed sample T-1 15-ft. to 30-ft. at 11:50 am. Rig trouble, crack needs to be fixed, stopped drilling at 11:50 am to make repairs, ended drilling for day, left grate over boring	
	14 November 2003 08:00 am, continued drilling at T-1	
40	40-ft. black, sludge content, degraded	120

GeoSyntec Consultants
COLUMBIA, MARYLAND

CLIENT & SITE: Waste Management, Inc. King George Landfill – Bioreactor Project.
PROJECT NUMBER: ME0284
LOG, LOGGER & DATE: Borehole T-1: Recirculation Area D Mandeville 14 November 2003
LCOATION: Northing: Easting: Elev. ft.
METHOD: Rotary 36" dia. Bucket auger

Depth (ft.)	Description of Waste / Notes	Time	Temperature (°F)	pH	Mass (lb) Density (pcf)
	43-ft. thin soil layer				
	45-ft. black waste, increasing moisture content completed sample T-1 30-ft. to 45-ft. at 08:15 am				
50	50-ft. very black, degraded waste, very wet, leachate		125		
	running down outside of bucket auger 52-ft. some plastic and cloth, still wet				
	56-ft. black, wet waste				
	58-ft. same as above				
60	60-ft. completed sample T-1 45-ft. to 60-ft. at 08:45 am ended boring at 60 ft bgs				
70					
80					

GeoSyntec Consultants
COLUMBIA, MARYLAND

CLIENT & SITE: Waste Management, Inc. King George Landfill – Bioreactor Project.
PROJECT NUMBER: ME0284
LOG, LOGGER & DATE: Borehole T-2: Recirculation Area D. Mandeville 14 November 2003
LOCATION: Northing: Easting: Elev. ft.
METHOD: Rotary 36" dia. Bucket auger

Depth (ft.)	Description of Waste / Notes	Temperature (°F)
	Cover: <4-ft. cover material, brown clayey soil Started boring at 08:55 am	
	4-ft. mixed waste, some plant material, little plastic	80
10	10-ft. thin layer of soil, increased plastics in waste	
	12-ft. mixed waste, little food or paper	
	14-ft. mixed waste, increased paper, little change in moisture content	90
	18-ft. increased plastics	
20	completed sample T-2 4-ft. to 20-ft. at 09:15 am	
	20-ft. black waste, increased degradation, layer of soil	
	22-ft. decreased moisture content, increased plastics	
	24-ft. similar to above	
30	28-ft. increasing moisture content, damp newspaper, no date, increased degradation, black soil at 29-ft.	125
	33-ft. chunk of metal	
	34-ft. mixed waste, increased moisture content	120
	completed sample T-2 20-ft. to 37-ft. at 09:40 am	
40	37-ft. very black, wet waste, significant change from above, leachate running down side of bucket	

GeoSyntec Consultants
COLUMBIA, MARYLAND

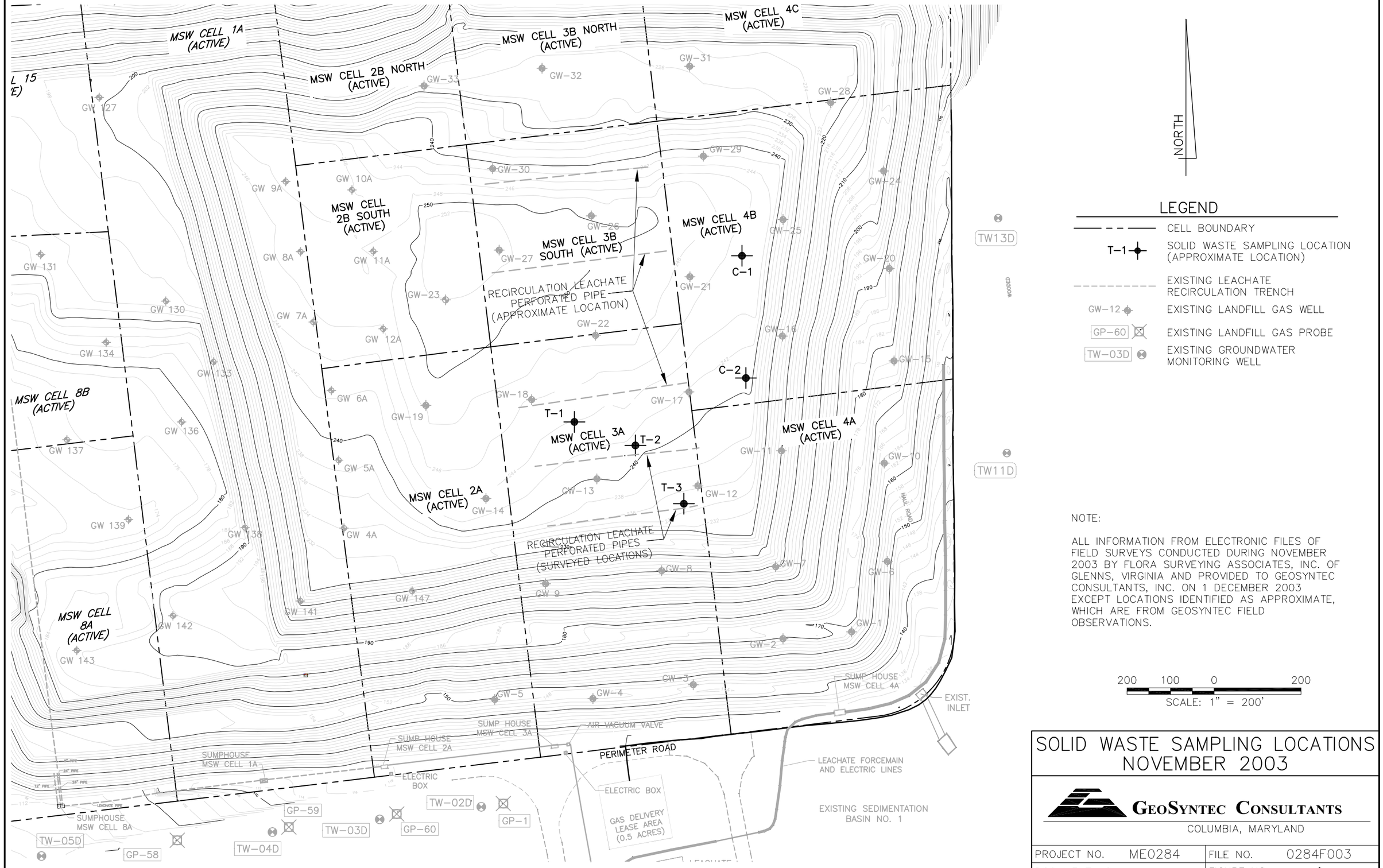
CLIENT & SITE: Waste Management, Inc. King George Landfill – Bioreactor Project.
PROJECT NUMBER: ME0284
LOG, LOGGER & DATE: Borehole T-2: Recirculation Area D Mandeville 14 November 2003
LCOATION: Northing: Easting: Elev. ft.
METHOD: Rotary 36" dia. Bucket auger

Depth (ft.)	Description of Waste / Notes	Time	Temperature (°F)	pH	Mass (lb) Density (pcf)
	42-ft. very wet, black waste, highly degraded				
	44-ft. same as above, very few identifiable components		130		
	completed sample T-2 37-ft. to 47-ft. at 10:00 am				
50	50-ft. mixed waste, decreased moisture content				
	54-ft. black waste, not was wet as 37-ft. to 47-ft. range no paper or food scraps				
	56-ft. same as above				
60	completed sample T-2 47-ft. to 59-ft. at 10:35 am				
70					
80					

GeoSyntec Consultants
COLUMBIA, MARYLAND

CLIENT & SITE: Waste Management, Inc. King George Landfill – Bioreactor Project.
PROJECT NUMBER: ME0284
LOG, LOGGER & DATE: Borehole T-3: Recirculation Area D. Mandeville 14 November 2003
LOCATION: Northing: Easting: Elev. ft.
METHOD: Rotary 36" dia. Bucket auger

Depth (ft.)	Description of Waste / Notes	Temperature (°F)
	Cover: <4-ft. cover material Started boring at 10:50 am	
	4-ft. mixed waste, some wood, little degradation	85
	9-ft. phone book, still legible, yard waste	
10	10-ft. mixed waste, increased plastic and bottles	
	13-ft. slight increase in moisture content no legible paper	
	17-ft. decrease in moisture content, dry feathers/pillow completed sample T-3 4-ft. to 17-ft. at 11:15 am	110
20		
	21-ft. mixed waste, increased moisture content and degradation	
	24-ft. similar to above	
	25-ft. increasing moisture content, leachate on side of bucket	
	26-ft. wet waste, black, degraded	
	28-ft. wet waste, black completed sample T-3 17-ft. to 30-ft. at 11:35 am	115
30		
	32-ft. wet waste, some soil	
	35-ft. wet waste, liquid in boring, difficult to drill and get samples to surface	
	38-ft soil layer, wet, obtained soil sample completed sample T-3 30-ft. to 40-ft. at 12:05 pm	
40	ended boring at 40-ft bgs, could not drill deeper	



LEGEND

- CELL BOUNDARY
- T-1 — SOLID WASTE SAMPLING LOCATION (APPROXIMATE LOCATION)
- EXISTING LEACHATE RECIRCULATION TRENCH
- GW-12 — EXISTING LANDFILL GAS WELL
- GP-60 — EXISTING LANDFILL GAS PROBE
- TW-03D — EXISTING GROUNDWATER MONITORING WELL

NOTE:

ALL INFORMATION FROM ELECTRONIC FILES OF FIELD SURVEYS CONDUCTED DURING NOVEMBER 2003 BY FLORA SURVEYING ASSOCIATES, INC. OF GLENNS, VIRGINIA AND PROVIDED TO GEOSYNTEC CONSULTANTS, INC. ON 1 DECEMBER 2003 EXCEPT LOCATIONS IDENTIFIED AS APPROXIMATE, WHICH ARE FROM GEOSYNTEC FIELD OBSERVATIONS.

200 100 0 200

SCALE: 1" = 200'

SOLID WASTE SAMPLING LOCATIONS NOVEMBER 2003

GeoSyntec Consultants

COLUMBIA, MARYLAND

PROJECT NO.	ME0284	FILE NO.	0284F003
DOCUMENT NO.		FIGURE NO.	1

P:\cadd\0284-king g\0284f003.DWG, Layout1, 1/16/2004 1:46:19 PM, g... (joc)